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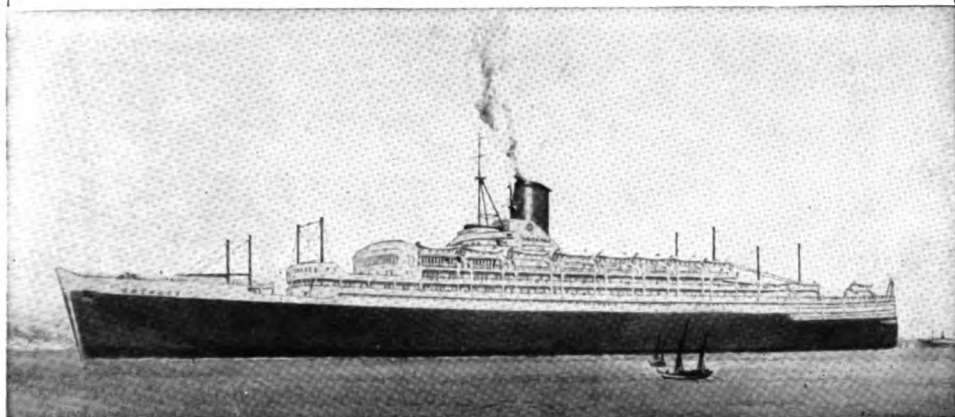
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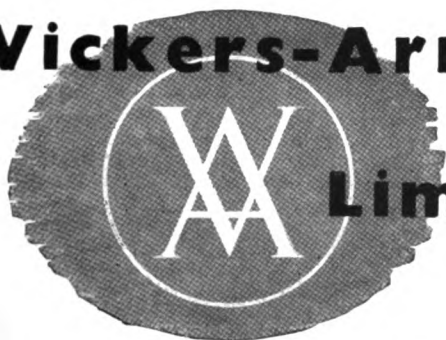
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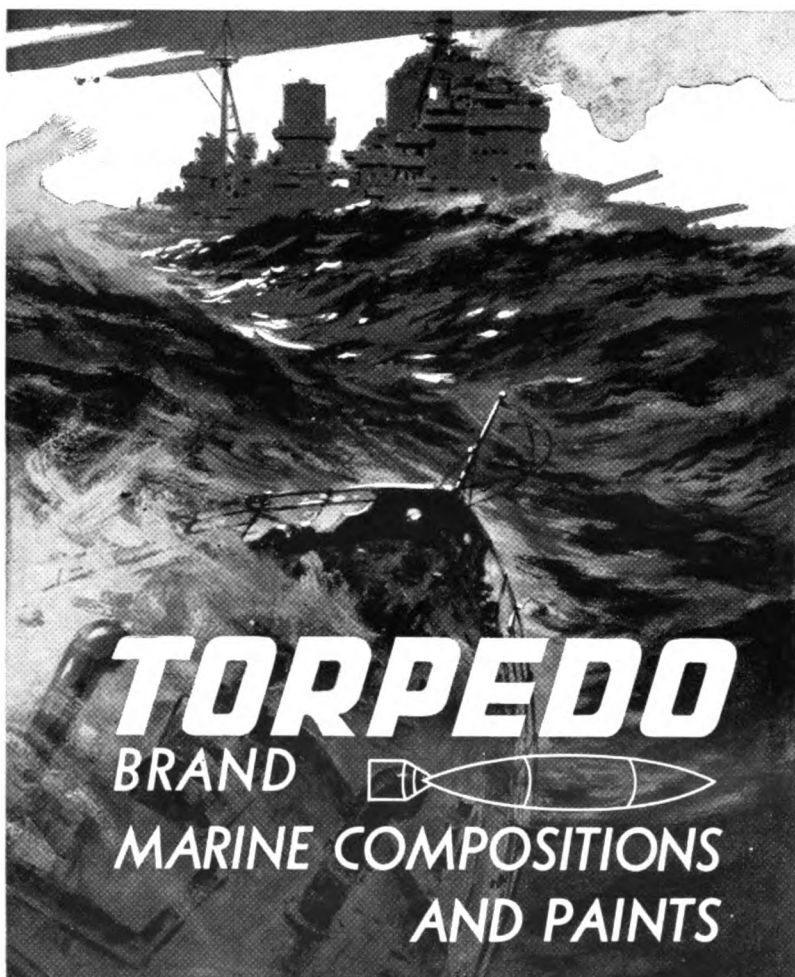


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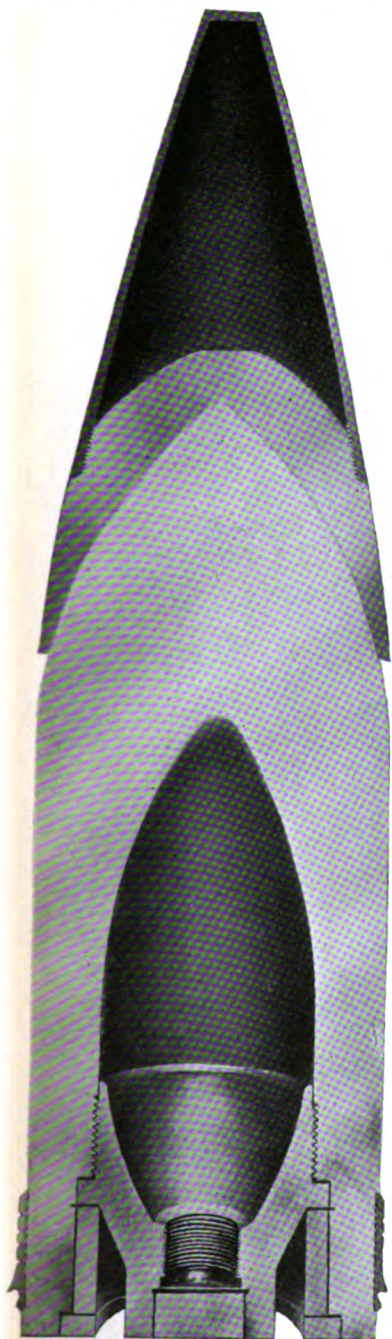
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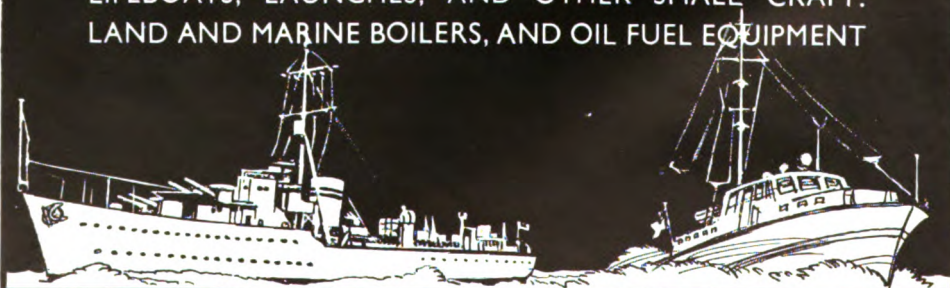


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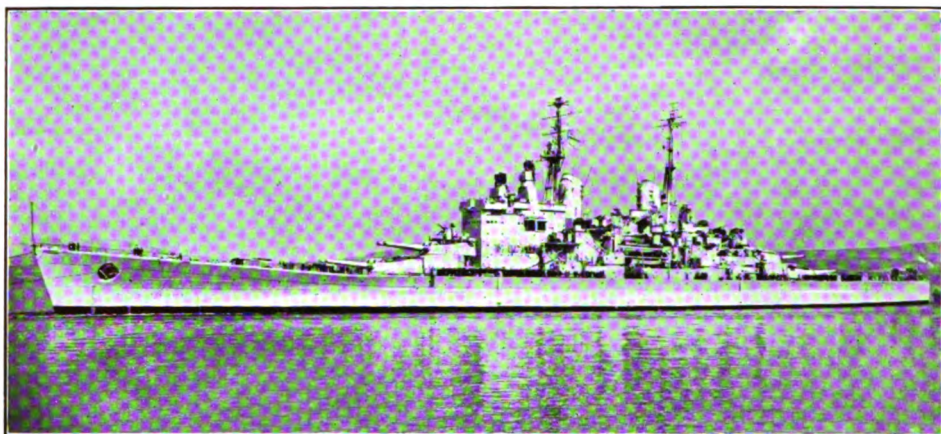
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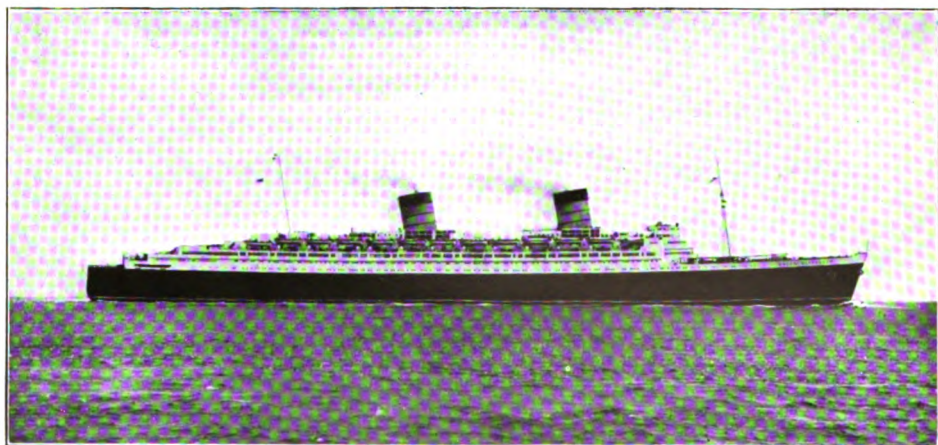
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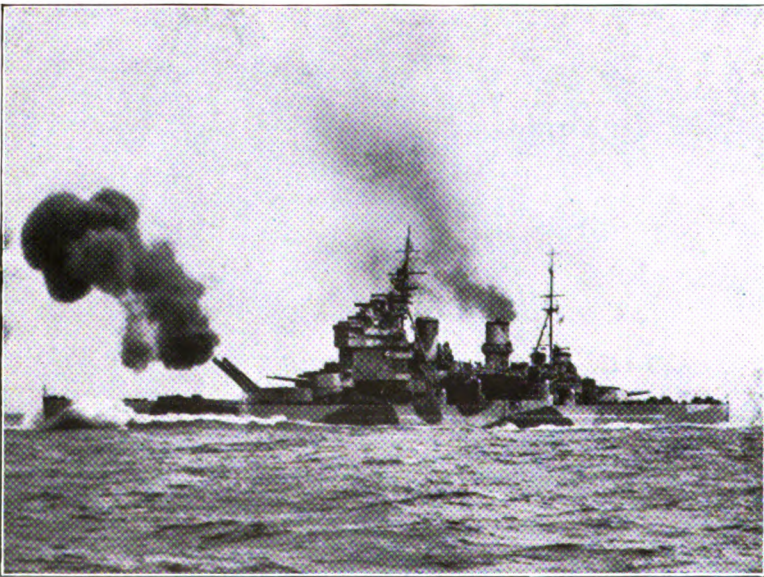
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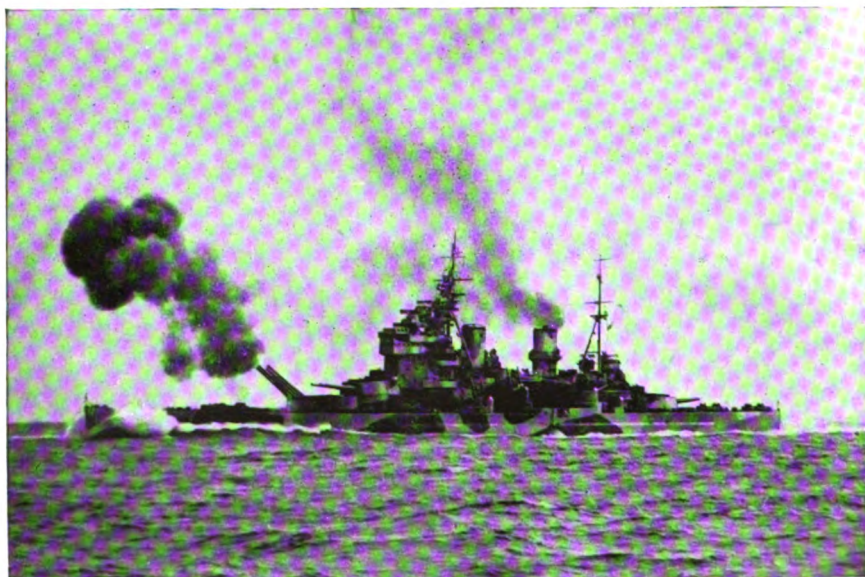
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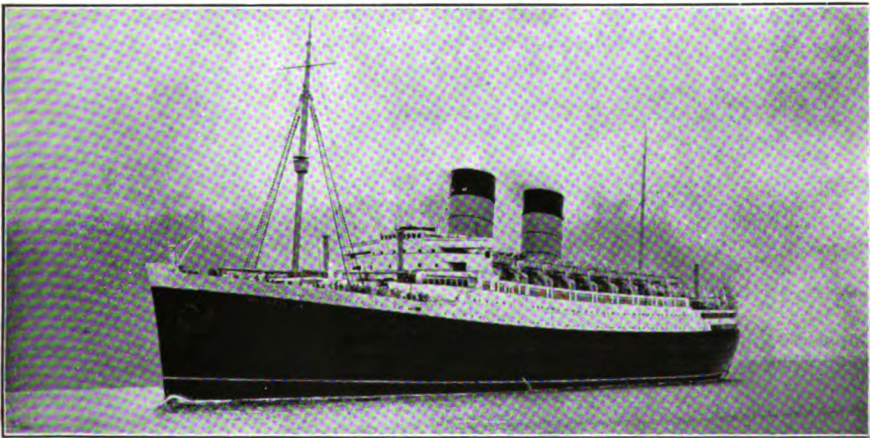
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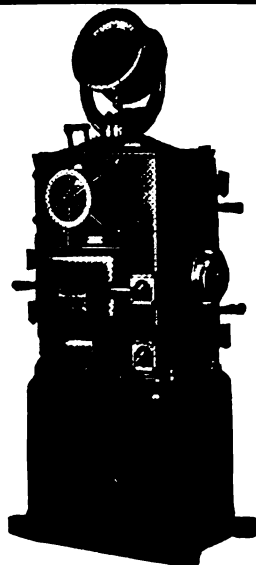
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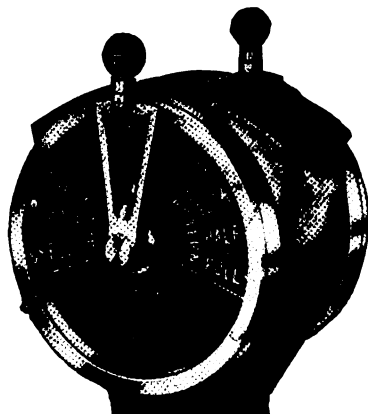
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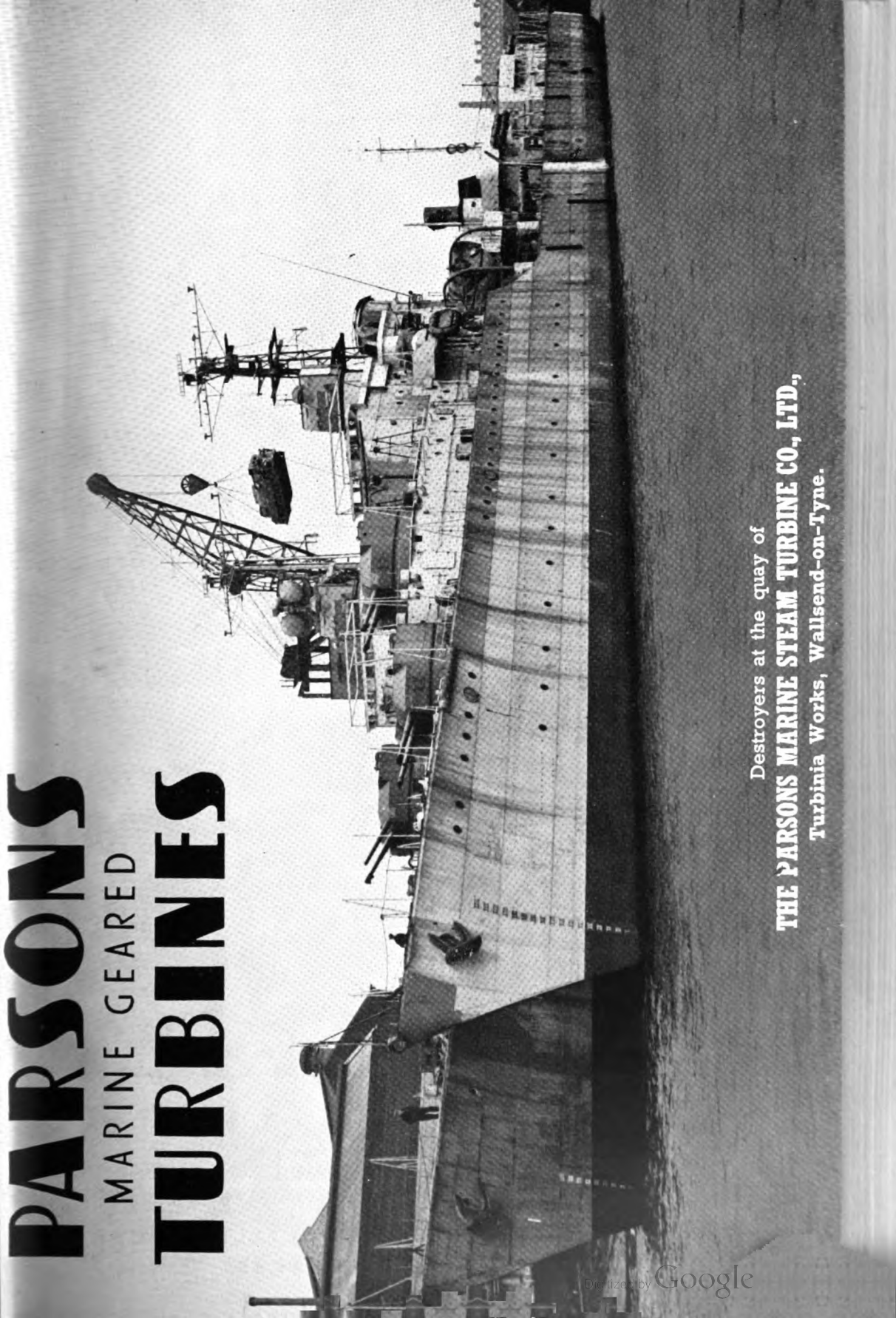
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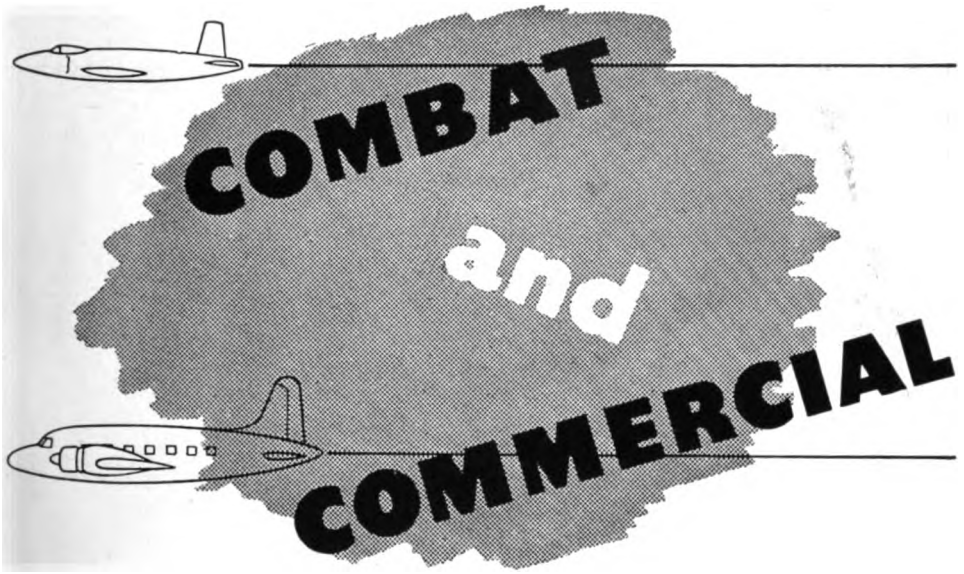
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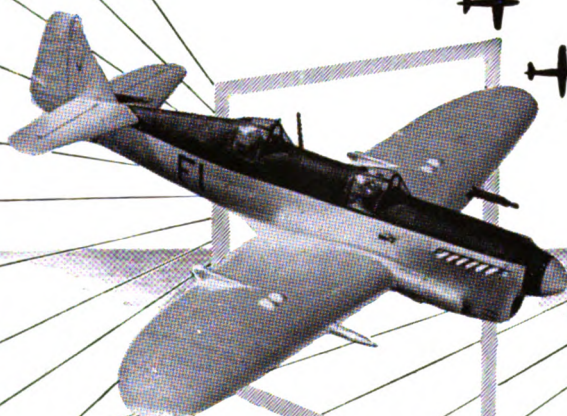
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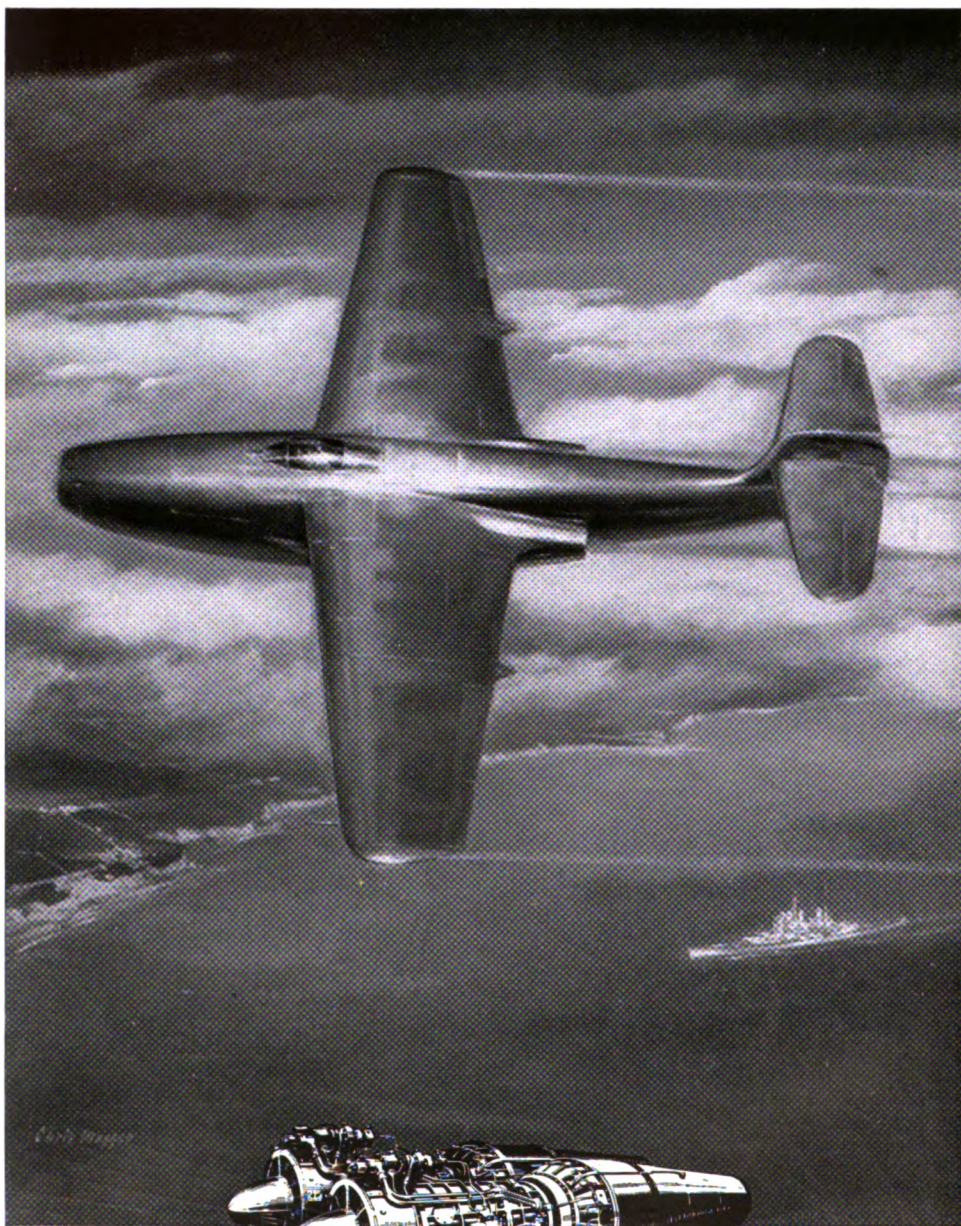
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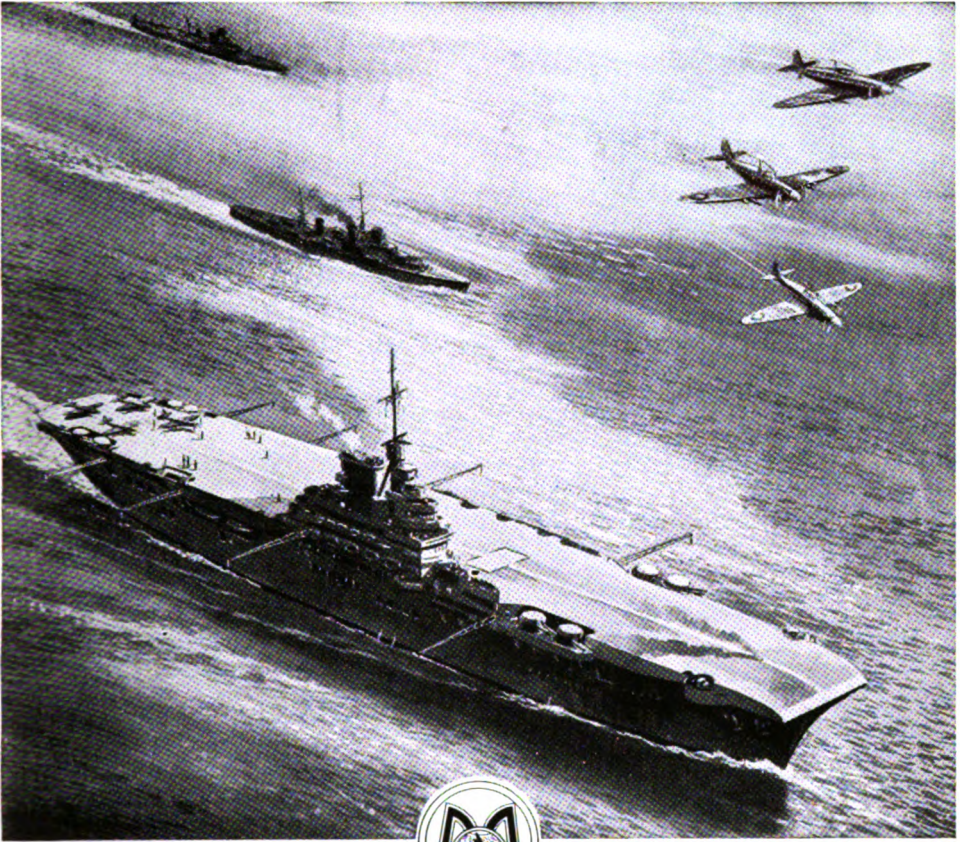
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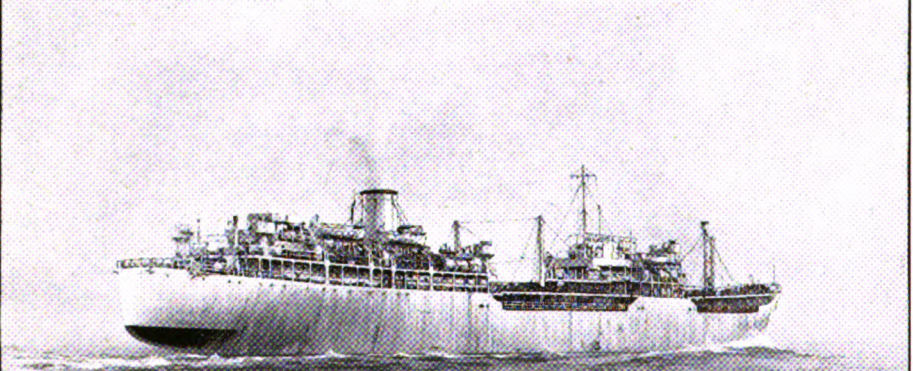
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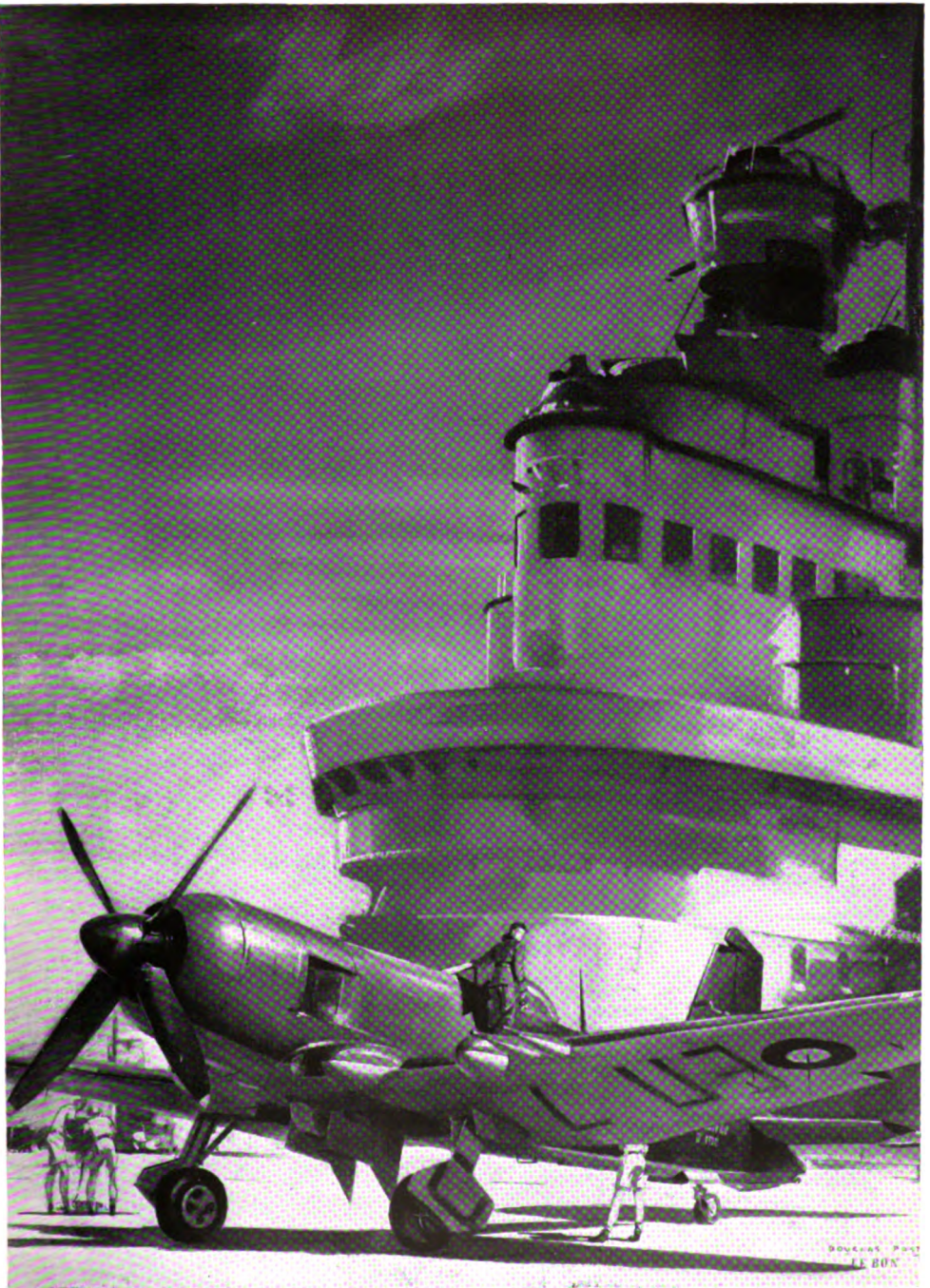
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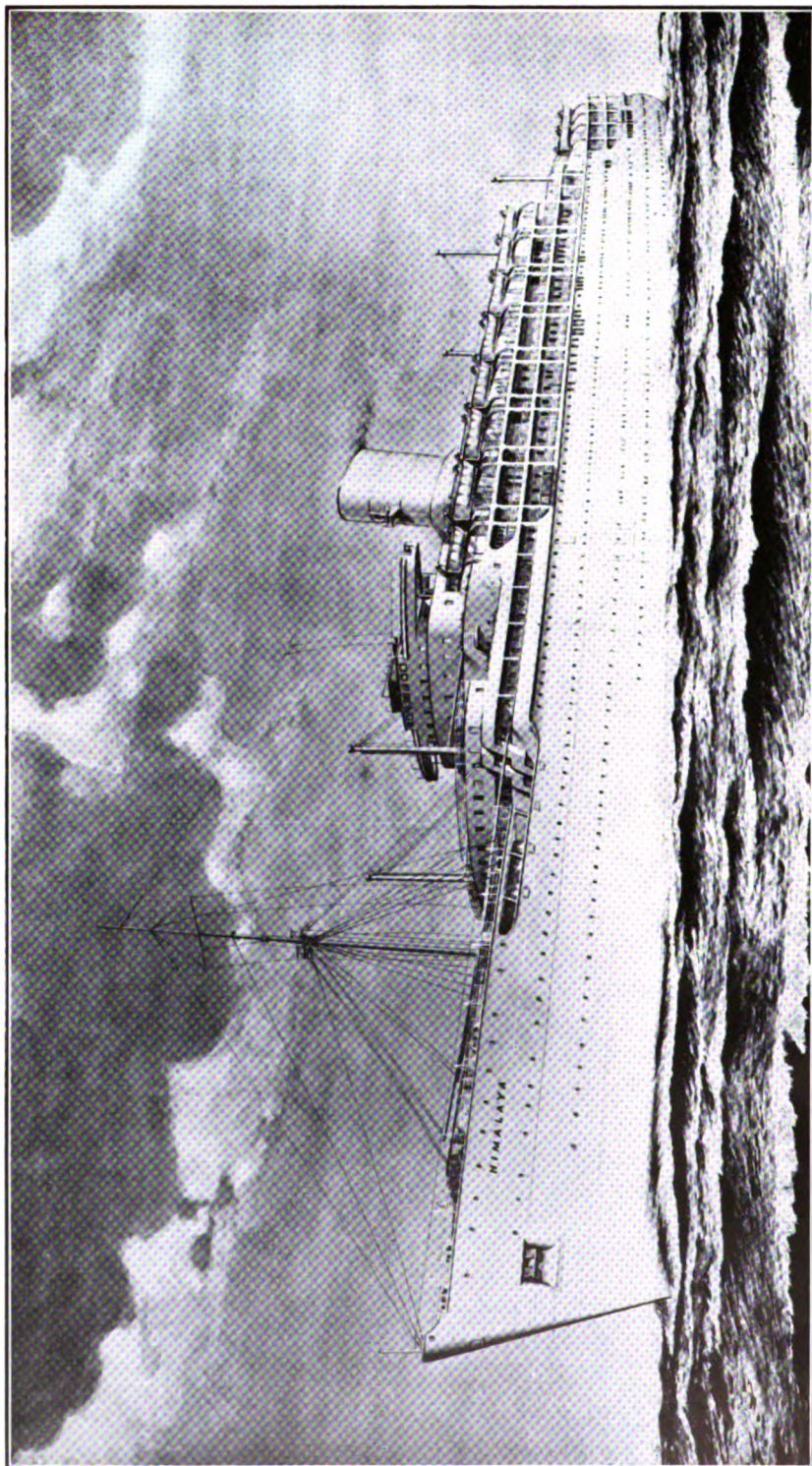
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FIFTY-EIGHTH YEAR OF PUBLICATION

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PREFACE.

THE difficulties of book production mentioned in the Preface to last year's issue of "Brassey" have not diminished in the last twelve months—rather the reverse, in fact—with the result that the publishing date remains late in the year, though the greater part of the contributions were perforce completed in the first half of the year. In the years succeeding a great war, however, the navies that survive it are occupied more in the process of a reduction to a peace establishment than in development of their war potential; and there is correspondingly little fresh development to chronicle as having been achieved in the year under review. The body of this Annual is therefore devoted more to forecasts of the future than to chronicles of the past; and for those, the delay in publication until near the end of the year is unimportant. As regards chronicles of the past, however, it must be remembered that the numerous original despatches, and translations of German naval archives, which were issued by the Admiralty in the middle of the year, only became available after this issue was already in the press; and I would like to forestall the reader's possible criticism that no reference to them is to be found in this volume, nor does it contain mention of facts, hitherto secret, which were revealed in them for the first time.

The progress of naval events is chronicled, in respect of the Royal Navy by Captain Altham in Chapter II, and of Foreign Navies by Mr. McMurtrie in Chapter III—with a separate chapter, No. XII, on the Bikini Atom Bomb Trial by a writer who actually witnessed them. Of the war period farther back, there is an account in Chapter XI, by one who had much to do with its smooth working, of the process of naval collaboration between the Royal Navy and the minor Allied Navies, the Governments of whose countries, exiled from their own soil, found refuge in the United Kingdom. I am also very glad to be able to include, in the realm of history brought up to date, a penetrating study of the Rise and Fall of Japanese Sea Power by Captain W. D. Puleston of the United States Navy—well known as the biographer of Admiral Mahan and a former Director of Naval Intelligence at Washington. The remaining six chapters of this year's issue, besides my own Chapter I on the general aspect of the subject, are devoted, each in the sphere indicated by its title, to future developments—either in the form of defining alternatives between which choice will have to be made, or of forecasts of the form that actual developments will take.

The task of revision of the Reference Section—a heavy one in these days of transfers of ships from one list to another and general reduction of navies from war to peace establishments—has been undertaken by Mr. R. J. Daniel, to whom my thanks are due. It is his hope, and mine, that it includes accurately all the information that had been made public up to the first day of this year. In the "Miscellaneous" section, besides the usual abstracts of and extracts from the Navy Estimates of the year, I have included a transcript of the Naval Clauses in those Peace Treaties which have so far been concluded.

I desire to acknowledge with appreciation and thanks the courtesy and assistance of all those who have supplied the information and data for which they have been asked.

H. G. THURSFIELD.

CHAPTER I.

THE NAVAL PROSPECT.

It is the function of an annual not only to chronicle the events of the year under review but also to record—so far as the information is available—measures that are being taken, or foreshadowed, to provide for the developments of the future; and for the latter purpose it is proper to look forward, as far as the power to do so is granted to the writer, and make some estimate of what those developments are likely to be. In the past—in the fifty-seven years during which “Brassey’s Naval Annual” has appeared, at least—there has been no undue difficulty in the naval sphere in achieving that measure of prophecy. Navies have grown in size and power between wars or have been neglected and allowed to decline. Growth or stagnation have been determined chiefly by the political situation and by the prosperity or decline of individual nations. Schemes of general disarmament—often the result of the weariness or reaction that is liable to overtake nations after a prolonged or widespread war—have at times slowed down the development even of those navies which have not suffered from the neglect of their countries’ governments. Development has been accelerated once again as idealistic prospects have faded or pugnacity and potential aggression have once more come to threaten the international situation. But whether navies have grown or declined in particular periods, the process of technical development has continued steadily, as scientific or mechanical progress has been turned to the development of weapons or the vessels that carry them. Naval development in the past was a continuous and ordered process, faster or slower as dictated by world conditions, but not altering in kind.

It is true, of course, that for a century past prophecies have many times been confidently made that this or that invention or new weapon, which had just made its appearance, was certain to render all navies obsolete, to make their operations impossible, or to cause such far-reaching changes that the influence of sea-power upon world development had become a thing of the past. So devastating, for instance, was the effect of an explosive shell when fired at a wooden man-of-war, compared with that of the solid shot which had been the only effective artillery projectile up to the middle of the last century, that the day of the large warship seemed to be over until the development of iron-plate protection redressed the balance. Twenty years or so later Mr. Whitehead’s invention of the locomotive torpedo gave to the smallest and flimsiest of ships a weapon which was capable of destroying at a blow the most powerful warship afloat. Again the enthusiasts sounded the death-knell of the great ship, and so far convinced the French Government of the day, at least, that they suspended the building of battleships and cruisers in favour of small torpedo boats in large numbers. Again, however, the prophets proved to be over-sanguine, for not only did improvements in methods of naval construction provide a fair measure of resistance to the under-water attack of the torpedo, but the small, fast torpedo craft proved to be subject to many limitations to which enthusiasts for it had been blind, and to be

highly vulnerable to the "torpedo-boat destroyer" which was evolved very soon after the torpedo boat itself.

Amongst new weapons, the course of prophecy and refutation is specially illuminating in the case of the Whitehead torpedo—which is still, to-day, one of the most effective of weapons at sea. It was perfectly true that in the torpedo there had come into existence a weapon capable of destroying the greatest and most powerful of warships and yet capable of being carried and employed by the smallest. What was unsound, however, was the inference from that development, that the day of the great ship was past; for it does not suffice merely to have the power, in special circumstances, of destroying one's enemy at sea unless one also possesses the power of bringing about those special circumstances at will, whenever need arises and whatever the conditions of the moment. The torpedo boat could sink the battleship if it could get within effective range of her—and "effective," in the case of a slow-moving projectile like the torpedo, means "close." As soon as it was realised that it was only (a) within the torpedo-boats very limited radius of action, (b) when the weather was moderate or the waters sheltered, and (c) in darkness or thick weather, that the torpedo boat could make sure of getting to close quarters, it became clear that its effectiveness against the great ship was very limited after all.

It could, to some extent, reduce the sphere of the great ship's omnipotence, hitherto circumscribed by natural forces alone; but that was the extent of its power. It put an end to close blockade by heavy ships, since that entailed the heavy ships remaining within the radius of action of the defending torpedo craft based on the blockaded point, and so being vulnerable to the new weapon whenever the other two conditions supervened. A blockade such as Cornwallis maintained off Brest in 1803, when he was wont to cruise close off the port and to stand right in to the Goulet until within range of the shore batteries, if there was a chance of engaging Ganteaume's fleet, would have been quite impossible in the Heligoland Bight in 1914, and it was not attempted. But the torpedo boat, though it compelled heavy ships to abandon one particular form of operation, never came near achieving such mastery as to render her obsolete.

The reason is that naval warfare does not consist of battle alone. It is a struggle for command of the sea, for command of a highway and means of communication, not of territory capable of being continuously occupied. To achieve command of the sea, it is necessary to be continuously ready to engage in battle against any enemy that would challenge free use of the sea highway; but it is equally necessary to exercise control of it continuously, without intermission, even when challenges are few and not formidable. If the great ship, or any other class of vessel, comes to have a use in the process of gaining and maintaining command, the appearance of a new weapon capable in special conditions of destroying her does not render her obsolete; it would need a weapon capable of destroying her in *all* conditions to do that, a weapon, that is to say, possessing all her range and powers of endurance as well as superior striking power. The ironclad ship driven by the steam engine so completely outclassed the wooden sailing ship in all respects that the latter eventually disappeared from navies. But no single weapon that has appeared since has proved to be so great an advance on the mechanised warship armed with guns as to produce that overwhelming result; and despite the claims, made by enthusiasts, to omnipotence for each new weapon when it appears, it

behoves those upon whom lies the responsibility for national security to insist upon full confirmation of them before they are accepted. In the words of Mahan, it is possible to be too quick in discarding the old as well as too slow in adopting the new, and the former error may well be just as disastrous as the latter.

Acting steadfastly on that principle, British Admiralties have not allowed themselves to be stampeded into premature drastic change. Admiral Sir Percy Scott, after the close of the 1914-18 war, used to bombard the public, through the newspapers, with the strident enquiry "what is the use of a battleship?" ; and, following it up by the assertion that every midshipman knew that it was "no damned use at all," with equally strident exhortations to "scrap the lot" in favour of submarines. Later enthusiasts, of whom Air Marshal Sir Arthur Harris was perhaps the most prominent, made use of the same exhortations, though in their case it was the aircraft which was to render them obsolete rather than the submarine. Successive Governments fortunately turned a deaf ear to these theories, though it will be recalled that Mr. Ramsay MacDonald and Mr. Hoover once issued a manifesto—of their own motion, without expert advice—declaring their confident belief that battleships would shortly disappear from the navies of the world. The soundness of the determination not to be "too quick in discarding" was fully demonstrated more than once in the course of the late war.

The most striking instance, perhaps, was in 1941, when the vital transatlantic supply traffic to these islands was threatened with disruption, far more complete than any that the U-boats had been able to compass, by the appearance in the Atlantic of the fast German battleships *Scharnhorst* and *Gneisenau*. In the course of their first cruise they succeeded in destroying 22 British merchant ships which they encountered when sailing unescorted ; but that was all that they did achieve, and it was a result which, taking the whole situation into review, can only be rated as trivial. If they could have got to grips with a single transatlantic convoy, they could at one blow have achieved three times the amount of destruction that they actually did in their whole cruise, for none of the comparatively slow merchant ships could have outdistanced them and escaped. In the event, they did make contact with more than one convoy, but with none of them could they get to grips ; for the convoy escort in each case proved to include a British battleship—the only force they were not ready to face and the only force which, in the conditions of that time, was capable of defending the convoys from such an enemy.

If we had listened to the air enthusiasts, we should not have had the battleships available ; and the air enthusiasts cite the case of the battleships *Prince of Wales* and *Repulse* which, a few months later, were sunk out of hand by that arm unsupported by any ships at all. But no air forces at that time could have provided the protection needed by the convoys threatened by the *Scharnhorst* and *Gneisenau*, for their encounters took place far out of reach of both British and Axis air bases. Nor could air forces, of the performance of which they were capable at that time have ensured the interception of the German battleships before they could reach the open ocean—that was well demonstrated by the success of the *Bismarck*, a year later, in gaining the open sea without even being observed from the air, much less attacked. To say this is not in any way to belittle the immense powers of air forces, either as they were then or as they have developed since. Given conditions suitable to them—

as they were when the Prince of Wales and Repulse cruised at leisure, without air support, within easy range of a numerous and well-equipped air force fully trained for sea operations—air forces even then could, and did, prove themselves masters of a particular sea situation. It is merely to maintain that special powers are not necessarily general in their application, and that naval strategy has to provide for all conditions that may be experienced, guarding against the facile assumption that specially favourable conditions will prevail when matters are put to the test.

All these examples serve to illustrate the theme with which this chapter opens, that up to the present there has been no great difficulty, year by year, in forecasting with fair confidence the general course of the development of navies in the immediate future. It is maintained, however, in some quarters that to-day we are once more at a crossroads—that title, indeed, was selected for the atomic bomb experiments at Bikini as being symbolic of their portent—comparable to the period that saw the disappearance of the wooden sailing ships that had composed all navies for centuries past. It is not only the atomic bomb that is cited as heralding drastic change, if not extinction, for navies as we have known them. The immense development of the powers of air forces that took place after the 1941–42 period quoted above, exemplified by the course of the war in the Pacific, were independent of the development of the atomic bomb, and they clearly foreshadow, it is said, the supersession of sea forces by those of the air; or if not that, at least the disappearance of the battleship to which so great a part of naval resources have been devoted in the last century. The development of self-propelled weapons—rockets, which provide their own propulsive force, in place of shells, which call for a heavy gun and a substantial gun-platform—points in the same direction. The fact that such missiles may be guided in their flight or self-directed to their targets is also cited in support of the thesis; though actually that quality merely, increases their accuracy, without increasing their intrinsic striking power and is therefore of economic rather than military advantage. The development of other new weapons is also foreshadowed, presumably of chemical or physiological potency, for it is hardly conceivable that the evolution of any explosive more powerful than the existing atomic charge, which is already capable, it is to be supposed, of being incorporated in weapons other than the bomb dropped from an aircraft, can be prophesied.

Besides these material developments, there are the political results of a war that might embrace the whole globe to be taken into consideration. Navies, as we have known them, have grown up as part of national armed forces in a world composed of a multitude of sovereign states, many of them, on the average, of a common standard of material strength. The war of 1939–45 left the world with only three great Powers that count—the British Empire, the United States of America, and the Union of Soviet Socialist Republics—Russia, to wit. Of these, Russia is essentially a land Power, basing her strength on land forces and inscrutable to the rest of the world. The U.S.A. and British Empire are primarily sea Powers, deriving their strength from sea power in the first instance and having so many ideals in common with one another that conflict between them is inconceivable. This is a political situation which the world has never before known. Combined with the growth of really long-distance weapons, whether manned aircraft such as we have used hitherto, of the crew-less, guided weapons which were first making their appearance when the last war came to an end, it is bound to have a great and far-reaching effect

upon the development of navies. Whether or not one accepts all the conclusions which some writers draw from the present-day situation, as defined above, it cannot be denied that it is such as to make it exceedingly difficult to forecast with any confidence what that development is going to be.

With the world political situation "Brassey's Naval Annual," a purely professional publication, is not specifically concerned except so far as its effects upon naval developments may be already clearly defined. Nothing in these pages should be read as prophecy in any way what future political developments are likely actually to be. For instance, Dr. Rosinski's examination, in Chapter IX, of the place of sea power in a world of the future divided politically on the lines which appear to be developing to-day is neither intended to be nor should be taken as an expression of opinion that this or that Power, or group of Powers, is likely to engage in war with another. It is a purely strategical study, part of the process of keeping strategical ideas up to date; and that process, so far as it is extended from the present into the future, involves the use of certain hypothetical assumptions which may or may not actually materialise. That they *may* describe a future state of affairs must, of course, be regarded as a possibility—there would obviously be no value in discussing the strategical implications of a completely unreal situation. But to say that a situation is possible does not in any way prejudice the question of how far it is probable; and, as already pointed out, political prophecy or advocacy has no place in a purely naval annual such as this. The influence of the political developments of to-day upon naval development is not yet clearly defined, and for the present we are concerned more definitely with the material developments outlined above.

It seems desirable, therefore, to examine the question of how far it is true that the developments of to-day have invalidated the principles that have governed the development of navies up to now. The most striking of these developments is, without doubt, the atomic bomb which is capable, of course—as we knew before it was demonstrated in detail at Bikini—of destroying a ship just as effectively as it can destroy several square miles of a city, if it is exploded in the right place. That power in a new weapon, however, does not of itself render navies, or even particular classes of warships, obsolete; for there is nothing new in it. There is no class of ship afloat to-day which could not, in certain circumstances, be destroyed by weapons that were in existence before the atomic bomb was even recognised as a possibility, as the Barham and Prince of Wales were sunk by torpedoes, the Bismarck and Scharnhorst were sunk by guns and torpedoes, and the Tirpitz by bombs loaded with explosives of the conventional type. Less heavily protected ships were always even more easily destroyed by the same weapons, and it is hardly necessary to cite the many instances that the late war provided of the destruction of aircraft carriers, cruisers, destroyers, submarines and smaller craft sunk by gun-fire, rocket-projectiles, bombs, torpedoes and mines. Dr. Rosinski in Chapter IX, which follows, utters a warning against the superficial view which regards the atomic bomb as nothing more than "a bigger and a better bomb"; yet, from the point of view of the ship at sea, that is exactly what it is. It provides one more means by which, if it is accurately directed against its target, the greatest ship afloat can be destroyed just as certainly as was the Prince of Wales by Japanese air-borne torpedoes.

But it by no means follows that navies—if they are needed in the

strategical scheme of defence—have no defence against the atomic bomb. Although the Prince of Wales met with destruction when she cruised without air support 800 miles from a Japanese-occupied country, at a time when the Japanese air forces comprised only some 5,000 aircraft in all, the Anglo-American Pacific Fleet was able to cruise practically unmolested within sight of the mainland of Japan itself three years later when the Japanese possessed some 11,000 aircraft. The torpedoes which sank the Prince of Wales were just as capable of sinking her four sister ships in the British Pacific Fleet of 1945, but that they could not be launched against them because carrier-borne aircraft provided a screen that Japanese torpedo aircraft could not penetrate. The defence of a ship, or fleet, threatened by atomic bombs carried by, and to be launched from aircraft as were those at Hiroshima and Nagasaki, lies in preventing the aircraft from reaching its launching position; and that defence, if successfully achieved, is complete. It may not always be effective, of course—no method of waging war can be infallible—and in that case ships may be sunk in the future by atomic bombs as they have been in the past by guns or under-water weapons. But in any case war cannot be waged successfully without incurring losses. The British Empire was one of the victorious Powers in the late war, but she lost over 1,500 warships and naval craft in achieving victory. If there is a place in the strategical scheme for any class of ship, the appearance of the atomic bomb has not altered that state of affairs.

But, it is argued, it is not only air-borne atomic bombs that have to be taken into account in the future; they will probably be conveyed by crew-less, guided missiles, possibly moving at supersonic speeds so that interception is impossible. None would deny, of course, that the development of such missiles may be achieved—though it is to be noted that it had not been done up to the end of the war—but he would be very foolish who accepted the assumption that interception of such missiles would be impossible—as Hitler vainly believed that there could be no counter to the magnetic mine—even if they do travel at supersonic speeds. The ingenuity and scientific progress that may achieve the missile is just as likely to devise the means and apparatus of interception; and both developments as yet are merely possibilities of the future rather than accomplished facts.

Moreover, even if the guided crew-less missile with an explosive charge of atomic fuel were developed and the means of interception were not, it by no means follows that the warship is thereby rendered defenceless. London, it may be said, was defenceless against the V-2 rocket which moved at supersonic speed; but in the event, the V-2 attack was defeated by the capture and occupation of the launching sites. That method must always be effective against any weapon, and it is one which calls for the employment of the oldest and most fundamental of methods of war—the use of *all* arms in unison and collaboration to establish direct human control of the enemy stronghold.

The development of atomic explosive charges must, however, profoundly modify *methods* of war at sea, just as every new weapon has done in the past. The Whitehead torpedo and the submarine made the close blockade impossible and compelled the adoption, in 1914–18, of methods quite different from those of 1803–15 to accomplish the same end. The development of air attack in the late war had begun, at least, to compel modification of the strategic methods of 1918, resumed in 1939. In the

First World War, the essence of the British strategic pattern was the maintenance of a fleet of dominating strength between the German bases and the ocean of which the command was vital; and that entailed its concentration in a strongly defended base appropriately located. In the Second World War, such a concentration exposed the fleet to attacks from the air against which, at first, there was no adequate defence; and though in British waters defence was gradually developed until it was a match for such attack as the enemy was able to bring against it, that was not achieved in the Pacific. The powerful Japanese fleet was eventually destroyed, much of it at sea, but a large proportion while lying in its heavily defended bases; and the effects of Hiroshima and Bikini show that, in a base of the characteristics of those which have become conventional in the last generation, a fleet is even more vulnerable to-day to an enemy in a position to attack it with atomic bombs or other missiles. Clearly the methods of 1939 are to-day just as much out of date as those of 1815 were a hundred years later.

It would be just as unjustifiable, however, to conclude to-day that the days of fleets are therefore past as it would have been to adopt that conclusion—as, to some extent, the French naval authorities did in the 1870s and 80s—when the Whitehead torpedo was produced. Indeed, the course of the late war in the Pacific towards its close points the way to one, at least, of the modifications in methods of naval war that modern developments in science and engineering will compel. The American fleet in the Pacific was obliged, by the geographical conditions of that ocean, very different from those of the chief theatres of naval war in former days, to organise itself as to be independent of the fully developed naval bases upon which all naval operations had depended in the past. The British Pacific Fleet, when in due course it was brought into being on a reinforcement to that of the United States, was forced to follow suit; and the result of that fundamental development was that that overwhelming force was not vulnerable to an attack on its base as every former fleet had been, and as the Japanese fleet still was. An atomic bomb exploded above the fleet anchorage in Scapa Flow in 1918 would have wiped out the Grand Fleet as the target ships at Bikini were devastated, and would at one blow have brought victory to the Germany of the Kaiser. No such blow could have been struck against the Anglo-American Pacific Fleet in 1945, even if the Japanese had developed an atomic bomb. Just as dispersal proved a practically complete answer to air attack on German industry up to 1944, so the same antidote should be equally effective against the air attack of the future, whatever the power of the weapons used by the attacker. The possibility that atomic explosives may be launched against it will doubtless force upon a fleet of the future an even greater measure of dispersal, and independence of fixed bases, than was reached in 1945, but will not inhibit its operation, if the conditions of the day call for its employment.

The arrival of atomic explosives will also doubtless lead to material changes in the design of warships. Rifled guns evoked armour plating; torpedoes and mines produced double bottoms and "internal bulges"; air-borne machine-guns and cannon led to armoured control positions. Precisely what will be the effect on the design of warships of the latest developments must presumably depend largely on the official assessment of the results at Bikini. Certain imaginative artists have given free rein to their fancy in various organs of the illustrated press in portraying the "warship of the atomic age"; but in truth it may well be found that

there is little or no effective defence to be found in material development against the radio-active effects of atomic attack. I for one am not prepared to prophecy what, or how great, changes in design of warships are or are not toward. They will be reached by the ordinary process of working out by degrees—by trial and error to some extent—as will the corresponding changes in tactics and strategical methods.

Are navies, then, really at the cross-roads? The answer can only be reached from first principles, and to find it calls for enquiring into the nature of war. The wars of the past used to be classified as dynastic or religious. The former are out of fashion to-day—though Germany followed Hitler into a war, deliberately hastened because he did not wish to be too old to enjoy the fruits of victory, as blindly as ever nation went to war at the whim of legitimate monarch. But it is hardly possible to dismiss the latter so confidently, if the epithet “ideological” be recognised as the modern synonym for “religious”; and since we have had our object-lesson, in the years before 1939, of the danger of assuming that wars were already a thing of the past, we ought not to fall into the same error again. But whether another war arose out of personal ambitions of some future dictator, out of a clash of “ideologies,” or out of the turbulence of some small body of savages or criminals—a “police war,” that is to say—its object must be *control* of the enemy, not, be it noted, wholesale destruction. To gain that, destruction of his armed forces, as being the factor that disputes control, may well be sought. But destruction of anything beyond them, or anything in the nature of indiscriminate destruction, is as damaging to the victor—as we are now discovering to our cost—as to the vanquished.

The atomic bomb has achieved an immense power of destruction, but only at the cost of discrimination, and therefore can contribute little to the process of gaining or maintaining control in the course of a war, and that at the cost of making control after the war either barren and fruitless or vastly more difficult. It does not follow, of course, that a dictator or a nation will not be mad enough, or bad enough, to use atomic bombs, and a policy of obliteration—which is all they are good for—in a future war. If they do, it may well be that our civilisation may go the way of the 27 others that preceded it in the last 300 centuries or so, though that sequel is by no means inevitable; for methods of meeting attack with atomic explosives are perfectly feasible since, as already pointed out, conquest and occupation of their launching sites must be just as effective against them as it was in Holland in 1945 against V-2 rockets.

Control, therefore, must be the object of *any* war, whatever its cause, origin, or nature, and control is achieved by putting men on the spot—by conquest and occupation, that is to say, which can be achieved only by the collaboration of all arms to the common end. The physical process of putting an army in the vital position to exercise control involves moving them—against opposition—distances that may be as great as half across the world; and that process involves movement by sea. There is no present prospect of air transport replacing sea transport. Even if it be used for the movement of the armies themselves, their immense weight of equipment and subsequent supplies must chiefly be moved by sea at some part of their journey. It follows inevitably that command of the sea remains as fundamental and indispensable a factor as ever in the pursuit of victory. The nation which recognises that the possibility of being involved in war is not yet a thing of the past, and maintains armed forces

in view of the survival of that possibility, must be prepared to strive for command of the sea, whether its rôle is to be aggressor or defender. Command of the sea alone may not, will not necessarily bring victory ; but it alone can create the conditions that make victory possible.

Command of the sea, like other forms of control at which war aims, is not achieved by destruction alone, though destruction of the enemy force that threatens the use of sea transport is part of the process of gaining command. It involves continuing control of sea highways, and that involves staying on the spot continuously in company with the traffic that needs protection. That is possible, continuously, only to ships ; and it therefore follows that the forces of the future, whatever other elements they comprise, must certainly comprise ships of war. Arguing from first principles, the clear conclusion is that navies, and the warships that compose them, cannot be obsolete as long as transport by sea remains indispensable to the operations of armies.

What will those warships be, what sort or class of ship will compose the squadrons of the future ? Aircraft carriers certainly, as far as one can see to-day, for they alone wield the most potent weapon of to-day. But aircraft carriers cannot always defend themselves against naval attack, for aircraft are still subject to immobilisation through heavy weather. They will need warships proper for that duty, smaller and faster ships of the cruiser and destroyer types—modified in design, perhaps, in view of the attack to which they themselves are subject, and possibly armed with rockets rather than guns. Submarines, too, are likely to survive by reason of their capability of penetrating enemy-controlled waters without support. But what of the battleship, the huge, powerfully armed and heavily protected ship which costs so vast a sum to build and equip ? Will she survive ? Captain—now Rear-Admiral—Agnew of the Vanguard was reported to have described her, during a visit to the ship of a number of press correspondents, as possibly the last British battleship. How far is that tentative prophecy likely to be borne out ?

One thing seems certain—no navy will willingly devote a large part of its resources, never fully sufficient for its needs, to so expensive a class of ship unless its utility, its indispensability indeed, is fully established. To form a judgment as to whether the great battleship will be indispensable to-morrow calls for examination of how she came to be regarded as indispensable yesterday—to-day, it is clear from Captain Agnew's remark, the matter would clearly seem to be in the balance. There is no mystery about the previous question—the battleship of yesterday came into being because she, and she alone, could ensure command of the sea in certain circumstances, of which the most illuminating example is that already cited, of the Scharnhorst in the Atlantic in 1941. The evolution of ships-of-war, starting from the smallest that was competent to control the merchant ship, brought about a process of growth in power—and therefore in size necessary to carry the weapons that conferred that power—up to the limit, either of the mechanised possibilities of the day or of the power of the ships possessed by potential enemies. The wooden ship-of-the-line of a century ago was limited in size by the strength of the timber of which she was built ; the battleship of the 1940's was limited in size only by the economic consideration that it would be wasteful of resources to build her bigger than was necessary to outclass her opponents possessed by the enemy. But the Vanguard and the Missouri, like the wooden three-deckers of 100 years ago, came into existence because they alone could

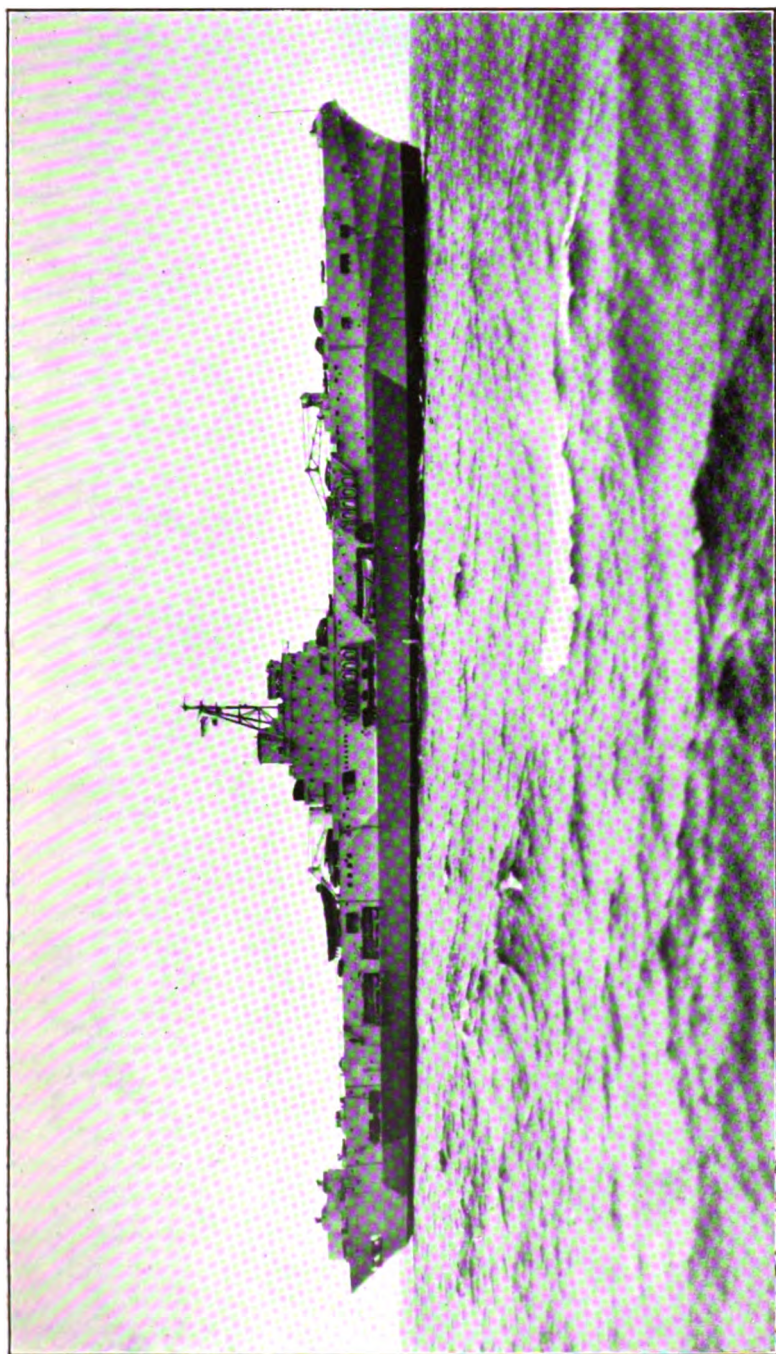
make certain of dealing with attack by their like in the hands of an enemy.

The later experience of the late war, however, seems to throw doubt on that principle. No ship-v.-ship battle occurred, yet the Japanese fleet was destroyed even more completely than was the Franco-Spanish fleet at Trafalgar or the Russian fleet at Tshushima. If in a future war that result can be achieved with reasonable certainty by the same methods, without the employment of great battleships, then the *Vanguards* will be as much a thing of the past as the *Victories* that preceded them. They survive to-day, though most of them are either in reserve or employed in the prosaic rôle of giving youngsters their sea legs—a rôle for which, it may be remarked, they are very ill-fitted. But if the British Empire or the United States should find themselves, through the failure of human wisdom, involved in war to-morrow, would they themselves utilise their great battleships in the process of securing and maintaining the command of the sea for which they must strive? And if so, could an enemy make sure of meeting that challenge effectively, and, in all circumstances, by any other means than providing even greater or more powerful ships?

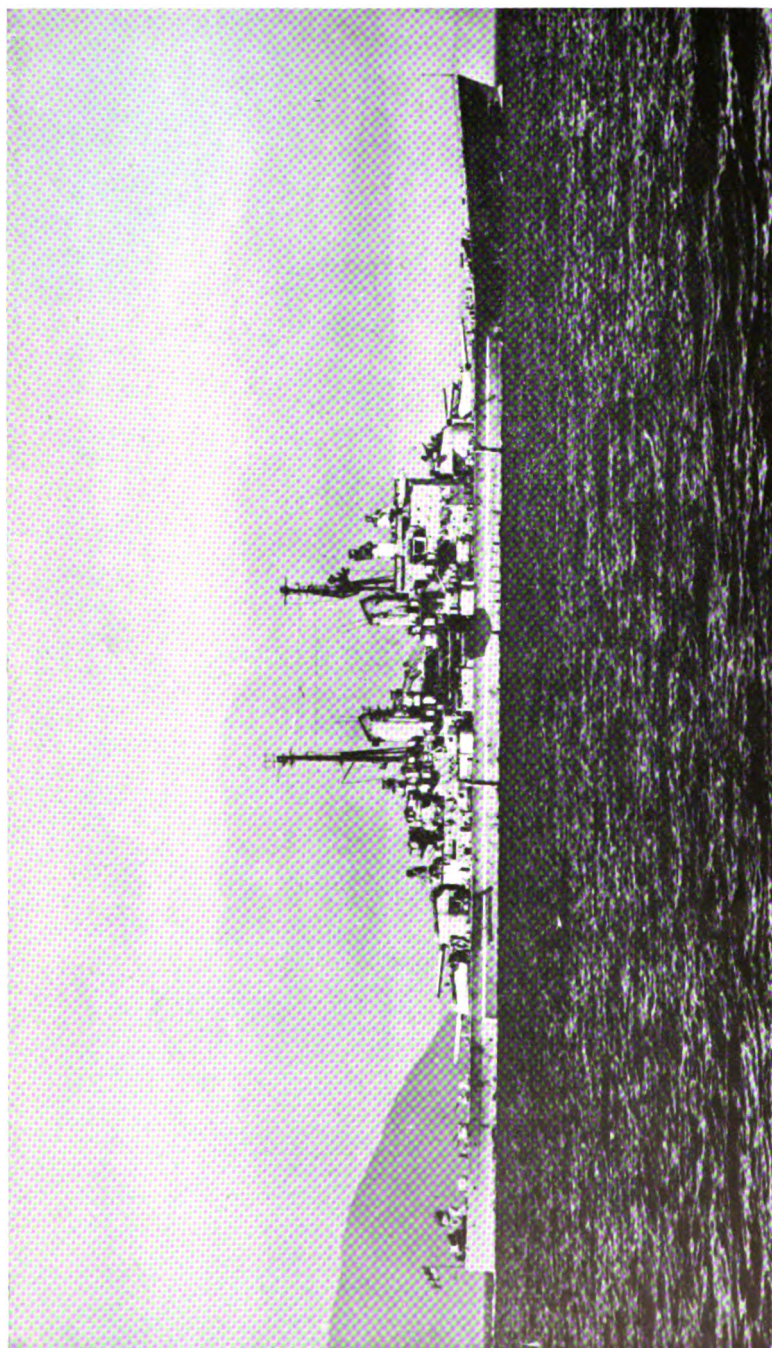
Some light may be thrown on this particular problem by the experience of the later stages of the Pacific war. The Allies, when they reached the phase of operating within the range of Japanese land-based air forces, found it necessary to provide their carriers, in addition to the defence afforded by their own aircraft and A.A. armament, and to the support of cruisers and smaller warships, with the close support of battleships; and the reason why battleships were indispensable for that function was that they alone provided a heavy A.A. armament with the elaborate and therefore bulky control which ensured high reliability and efficiency, combined with that substantial protection which enabled them to withstand damage that would have disabled any less well-protected warship. They did not, it is true, need their great guns in performing that essential duty; but great guns seem already to be in process of supersession by rocket projectors, which should endow them with undiminished striking power as against targets to which the great guns were appropriate—ships, or military objectives on an enemy shore—while at the same time saving weight and space for improved protection and heavier A.A. fire. It would seem to be clear, therefore, that the great battleship was by no means obsolete in 1945; and that, by whatever name the warship is called that will be needed to fulfil the 1945 function of the battleship, she is unlikely to differ from her very much either in size or in general characteristics.

These considerations would seem to govern the probable evolution of navies, so long as what has been called "a major war" is a possibility, however remote. Yet even that condition may change. Navies there will be, as long as transport by sea remains indispensable to conduct of civilised human affairs as it is to-day; for even if the nations of the world should succeed in abolishing wars on the national scale, they would be needed for police duties. Long views in their province are hardly possible to-day. It can safely be said that there will be little or no naval development in the material sphere in the coming year—no power to-day has either the motive or the resources to undertake it—any more than there has been in the year under review. Any prophecy that goes further can be based on nothing more than guess.

H. G. THURSFIELD.



H.M. Light Fleet Carrier Perseus.
(Courtesy of Messrs. Vickers-Armstrong.)



H.M.S. Vanguard.

(British official photograph. Crown copyright reserved.)

CHAPTER II.

THE NAVAL YEAR.

THE triumph of the Allied forces, which had culminated in the defeat of Japan in the late summer of the previous year, was celebrated, rather belatedly, in Britain on June 8, 1946, principally in the form of a Victory Parade in London and other festivities.

In the procession through the crowded streets of the capital was the First Sea Lord, Admiral of the Fleet Lord Cunningham, in the same car as the two other Chiefs of Staff; Admiral Lord Louis Mountbatten as one of the Supreme Allied Commanders; and an array of Flag Officers who had held the principal naval commands during the war.

The Navy was represented in the Mechanised Column by Amphibious Jeeps, Weazels, Dukws, Mobile W/T units, Aircraft Refuellers, and Mobile Sick Bays. In the Marching Column were contingents of Seamen, Engine Room ratings, Miscellaneous Branches and Reserves, Royal Marines, Naval Nursing Service, and the Women's Royal Naval Service. These were followed by small parties representing the Merchant Navy, Fishing Fleets, Lighthouse Services, Coastguards, Pilots, and Royal National Lifeboat Institution.

H.M. the King, wearing the uniform of an Admiral of the Fleet, took the salute from a royal enclosure erected in the Mall opposite St. James's Palace.

NAVAL POLICY.

After any great war, retrenchment on the fighting Services has naturally been the policy of the Government, and, despite much political lip-service to the need for a strong Navy, before the close of the year the fleet in commission had been whittled down to less than its peace-time strength before the outbreak of hostilities. To the need for economy, which caused such drastic cuts to the Navy after the 1914-18 war, there had now been added the argument that the whole future of warfare had been changed by the production of the atomic bomb and other new death-dealing inventions, while once again "collective security" was reappearing in the embryo form of the Security Council of a United Nations Organisation which, in its turn, had a strong resemblance to a rejuvenated League of Nations.

Speaking during the Defence debate, in March, the First Lord, Mr. A. V. Alexander, said that the Admiralty was then engaged in examining the future composition of the Navy. Alluding to the atomic bomb, he remarked that, curiously enough, it was the least likely (of new developments) to affect design radically. As a "bigger and better bomb" it might be expected to supersede all other bombs for attacking ships at sea but for the limitation that it was so colossally expensive to produce. Moreover, though one bomb could produce devastation over four square miles of city, that area at sea did not necessarily contain any large number of ships. He went on to say that if atomic bombs should become as cheap and plentiful as hand grenades, they might displace most other weapons in sea warfare; and if it were proved possible for a ship to survive attack

by them at all, we might see radical changes in the characteristics of war-ship design. "But these are both still large 'ifs.'" On the other hand, the development of rocket projectiles might bring about great changes in ships intended to fight each other.

Despite these technical and material considerations, the First Lord emphasised that the function of all war fleets in the world was still to keep the merchant ship, troopship, or supply ship moving and to protect it from damage and its voyages from interruption by the enemy. But, he concluded, "it can hardly be doubted that there will be great changes in the composition of fleets in the near future."

Speaking at a launching ceremony at the end of the previous year, Rear-Admiral C. S. Daniel, Controller of the Navy, had already forecast that naval construction must of necessity be on a small scale for the next two or three years, during which there must be research and development in an endeavour to determine the nature of the future Navy. He believed that "the change from the present to the new will be as great as that from sail to steam, if not greater."

In all the circumstances, therefore, it was not surprising that the First Lord should have informed the House of Commons in March 1946 that very large savings had been achieved by the use of the "axe" on naval construction after the end of the war. Since VE-Day, he said, 727 ships, from fleet carriers downwards, had been cancelled, giving a net saving of £125,500,000. Cancellations before VE-Day had yielded an additional £64,000,000. Only one battleship, the *Vanguard*, was under construction. It had already been decided not to proceed with the construction of the *Lion*, *Téméraire*, *Conqueror*, and *Thunderer* of the 1988 and 1999 programmes.

The policy of "wait and see" as regards new construction was understandable, and the scrapping of once fine ships so war-worn that they had become unfit for service was inevitable. But for some undisclosed reason the Admiralty were still reluctant to publish the composition of the various fleets and squadrons, even to an extent comparable to that done by the United States Navy Department. It was, however, no secret that there were by the end of the year only two battleships in full commission, the flagship of the Home Fleet and H.M.S. *Vanguard*, the latter fitting out for the Royal Tour to South Africa. Everywhere else Commanders-in-Chief afloat were flying their flags in cruisers or, when more convenient for some special reason, in aircraft carriers.

This policy of scaling down the sea-going fleet was, of course, largely governed by economy, but it was also influenced by a post-war tendency to depart from the principle that the normal place for the sailor is in his ship and an increasing disposition to provide him with more and more time on shore. This, presumably, was all part of that programme of social welfare and "betterment" which, because it is the trend of civilian life, was regarded as necessary for recruiting for the Navy. However that may be, service ashore, except for very necessary leave and specialist training, has never made for efficiency (and the discipline indispensable to it) afloat. Doubtless this regrettable tendency was the result of pressure from various quarters, but the Admiralty had at least been able to see to it that some young seamen made their home afloat at an early stage in their career, for it was made known in August that a Training Battleship Squadron, consisting of the *Nelson*, *Howe*, and *Anson*, was being formed and would be based on Portland. The main purpose of the squadron was to provide

elementary training in seamanship, gunnery, and torpedoes for those special service ratings who would form half the Navy's peace-time strength.

While the reduction in sea-going time and experience for officers and men consequent on the laying up of ships in reserve might not command general approval, the policy of improving pay, prospects, and living conditions both afloat and ashore had everything to commend it. These changes will be dealt with under their appropriate headings.

BOARD OF ADMIRALTY.

There were a number of changes among the Sea Lords during the year. The most important of these was the appointment of Admiral Sir John H. D. Cunningham to succeed Admiral of the Fleet Lord Cunningham of Hyndhope as First Sea Lord and Chief of Naval Staff. This took effect on June 10—two days after the Victory Parade. Admiral Cunningham had succeeded Lord Cunningham (then Sir Andrew) as Commander-in-Chief Mediterranean in 1948.

On May 26, shortly after he had relinquished the post of Deputy First Sea Lord, which he had held since 1942, Admiral Sir Charles Kennedy-Purvis died. In the post-war reorganisation of the Admiralty this post lapsed, as did that of Assistant Chief of Naval Staff (Weapons). Rear-Admiral R. D. Oliver, who had held the latter post, was on April 20 appointed a Lord Commissioner of the Admiralty and Deputy Chief of Naval Staff.

Vice-Admiral Sir Arthur J. Power relieved Admiral Sir Algernon U. Willis as Second Sea Lord and Chief of Naval Personnel in February.

Vice-Admiral D. B. Fisher was appointed Fourth Sea Lord and Chief of Supplies and Transport in succession to Vice-Admiral Sir Arthur F. E. Palliser in January.

Vice-Admiral Sir Philip L. Vian succeeded Rear-Admiral Sir Thomas H. Troubridge as Fifth Sea Lord (Air) in September.

The Third Sea Lord and Controller, Rear-Admiral C. S. Daniel, and the Vice Chief of Naval Staff, Vice-Admiral Sir Rhoderick R. McGrigor, had joined the Board late in 1945.

On October 5, 1946, with the publication of the White Paper announcing the formation of a Ministry of Defence, Mr. A. V. Alexander left the Admiralty, but remained in the Cabinet as Minister without Portfolio pending his appointment as Minister of Defence when the necessary legislation had been passed. This office was established and the appointment took effect as from January 1, 1947. Mr. Alexander was succeeded as First Lord by Mr. George H. Hall, formerly Colonial Secretary. Mr. Hall had been Civil Lord of the Admiralty in 1929-31 and Financial Secretary in 1942-48. The King subsequently conferred the dignity of a Viscountcy of the United Kingdom on Mr. Hall.

PRINCIPAL COMMANDS.

During 1946 all the remaining war-time Commanders-in-Chief were relieved in their Commands. In April Admiral Sir Harold M. Burrough succeeded Admiral of the Fleet Lord Tovey as Commander-in-Chief the Nore, and Admiral Sir Algernon U. Willis succeeded Admiral Sir John H. D. Cunningham as Commander-in-Chief Mediterranean Fleet.

On June 11 Vice-Admiral Sir Denis W. Boyd took over the Command of the British Pacific Fleet from Admiral Sir Bruce (afterwards Lord)

in the training of every night-fighter pilot and observer. The system was that the aircraft went up in pairs and took turns at acting as target and fighter. Instructors could assess the time taken by pupils to achieve the contact. The standard required to pass out was high. A destroyer was kept in readiness in case of a ditching.

Instruction in another form of sea-air technique has been provided for at the Joint Anti-Submarine School. It was announced on January 30 that arrangements had been completed by the Admiralty and Air Ministry for the inauguration of this joint establishment, which would be temporarily housed in Ebrington Barracks, Londonderry. Aircraft of the Royal Navy and Royal Air Force would operate from the R.A.F. stations at Ballykelly and Castle Archdale, and submarines and anti-submarine escort vessels would work from Londonderry. The School would be under the joint directorship of a Commander R.N. and a Wing-Commander R.A.F., and under the general command of the Naval Officer-in-Charge, Londonderry.

OTHER NAVAL TRAINING.

H.M.S. Collingwood, the former boys' training establishment at Fareham, was in process of conversion to a permanent school for radar and electrical training for officers and men of the new "L" or electrical branch. (See also "Personnel.")

Cadets of the Royal Naval College returned to Dartmouth at the opening of the new term on September 21. The College had been temporarily transferred in 1942 to Eaton Hall, Chester, after enemy bomb attacks at Dartmouth.

IMPROVED CONDITIONS OF SERVICE.

Two announcements—one in May, the other in August—by the Admiralty forecast improvements in service conditions. The first mentioned that the information was being given so that men whose time was due to expire soon might not be deterred from volunteering for a further period because of uncertainty about future conditions.

Improvements in the habitability of ships were outlined, and it was stated that cooking arrangements in men-of-war generally were being modernised as ships came in for large refits. Special reference was made to the Admiralty's wish to limit to the minimum the periods when married men are separated from their families. It has been approved in principle that men in the Royal Navy are to be provided with married quarters to the same extent as those of the other Services. Families of those appointed to a normal commission in a seagoing ship based on a port abroad are to be allowed free passages to that port and removal expenses; but neither of these privileges is likely to become immediately available. Conditions in which compassionate leave may be granted to men serving abroad have been eased; such leave will be granted in exceptional circumstances to men serving sentences of detention. The system under which a rating had to wait for a "liberty boat" before being allowed to "go ashore" from barracks has been abolished. The modernisation of as many permanent home naval establishments as possible has been accorded the highest priority in work to be undertaken in the next few years.

For men stationed ashore, commissions abroad will probably remain at 2½ years; but for men afloat, it was stated, schemes were under consideration to reduce absence from the United Kingdom to 18 months or a year.

It will not be possible, however, to do this for all types of sea-going ships. For the present the war-time scale of foreign service leave (7 days for each 6 months of foreign service, plus one day a month for broken periods) must be retained, but the peace-time scale (22 days a year) would be restored as soon as possible.

Supply and production facilities at present limit progress in improving uniform, but a new and more comfortable working dress and an improved type of cap were already in production. It is understood that the new seaman's cap can be worn square on the head even more conveniently than the existing pattern can be worn "flat aback."

NEW RATES OF PAY

Of even greater interest to the Service than these forecasts of improved living conditions were the new rates of pay and allowances, which came into force on July 1, 1946. A White Paper, published on December 20, 1945, gave details of a new scheme designed to improve pay generally and to equalise rates applying to all three Services as far as possible. A major change in principle was the abolition of "non-substantive" pay for specialist qualifications, e.g. gunnery, torpedo, communications, etc. Under the new scheme there is a basic rate covering both rank and qualifications; the qualifications previously entitled to non-substantive pay became part of the standard of proficiency required for advancement. Special pay is, however, continued for service in submarines and in the air. The following new basic weekly rates applied to all branches:

Ordinary rate (on entry)	..	..	..	..	..	..	..	28/-
" " (trained)	..	..	..	..	..	..	..	35/-
A.B. rate	..	..	..	..	..	..	..	42/-
Leading Seaman's rate	..	..	..	..	..	..	..	52/6
Petty Officer	..	..	..	..	..	..	..	63/-
Chief Petty Officer	..	..	..	..	..	..	..	73/6

Trade pay of 7/- to 14/- weekly is allowed to artificer ratings who are divided into three groups, viz: Group A (artificers); Group B (artisans); and Group C (all others). There is also a new increment system, which takes effect after 2 years' service from the age of 18, of 2d. per diem for A.B. rates and 8d. for Leading Seamen rates and above. This, while adding materially to basic pay, is designed to reduce inequalities due to the varying time taken by men of different branches or port divisions in securing advancement in vacancies. Good Conduct badges, carrying 2/4 weekly each, are awarded after 4, 8, and 12 years.

The grading of marriage allowances according to number of children is discontinued and a flat rate for all married men of the same rank has been introduced, viz. 35/- per week, with higher rates for Petty Officers and above. Servicemen's children are to be eligible for family allowances.

A new basic scale of pensions was also laid down in the White Paper and is also common to all three Services for men completing 22 years' service, with a higher scale for longer periods. It is considerably higher than the 1930 scale.

The White Paper states that, taking into account (a) the value of remuneration in kind, e.g. food, accommodation, and clothing, received by Service men, (b) the various expenses from which they are free, the pay of trained men in the basic grades, e.g. A.Bs. and stokers 1st class, who are also in receipt of marriage allowance is equivalent to a civilian wage of

£5 per week. This old argument always ignores the fact that the naval man if he is married has to maintain himself afloat and his family ashore. Originally it was decreed that special transitional arrangements were to be made for serving men with pay *reduced* under the new scales. Although only a limited number of men came into this category, any suggestion of reduction of pay under a scheme introduced ostensibly to raise the general standard was naturally very unpopular. This was speedily apparent, and on March 6 the Admiralty announced an important modification whereby there would be no reduction of pay in such cases and the old Code would apply until the "excess" had been absorbed in ordinary periodic increments.

OFFICERS' PAY.

The new Code of officers' pay was published in a White Paper on March 6. This, too, covered all three Services and the changes took effect from July 1, 1946. Here again the principle of "a common scale of basic pay" for officers of the Executive, Engineer, Electrical, and Supply and Secretarial branches was adopted, and specialist pay abolished. This met with some criticism on the grounds that it was inconsistent with the long-standing principle in the Services that pay should bear some relation to responsibilities; yet this was maintained in the case of officers commanding sea-going ships and flying and submarine officers, who continued to receive extra pay. The deprivation of specialist pay in the case of officers is also inconsistent with the continuance of "trade pay" to ratings.

In general, no considerable change was made in the rates for junior officers, but provision was made for a more substantial increase at about the age of 26, with further increases in the higher ranks. There are now biennial increments up to and including the rank of Captain R.N. The new scales of pay take into account the ages at which the various ranks are normally reached. The following are examples of the old (pre-July 1, 1946) and new daily rates of basic pay for naval officers:

<i>Rank.</i>	<i>Old Rates.</i>			<i>New Rates.</i>		
	£	s.	d.	£	s.	d.
Midshipman	6	10		7	6	
Sub-Lieutenant	13	0		13	0	
Lieutenant, on promotion	16	6		17	0	
After 2 years	16	6		19	0	
After 6 years	19	0		1	6	0
Lieutenant-Commander, on promotion	1	5	2	1	12	0
After 6 years	1	8	10	1	18	0
Commander, on promotion	1	14	2	2	7	6
After 6 years	2	1	6	2	15	0
Captain, on promotion	2	12	4	3	5	0
After 6 years	3	1	4	3	14	0
Rear-Admiral	4	10	6	5	10	0
Vice-Admiral	5	8	8	6	15	0
Admiral	6	6	8	8	0	0
Admiral of the Fleet	7	4	10	9	0	0

Executive officers in command of sea-going ships are eligible for Command Money, rising from 3/- a day for a Lieutenant to 10/- a day for a Captain in command of a major warship.

Flying Pay or Submarine Pay is payable at the rate of 3/- a day up to and including the rank of Lieutenant-Commander. All other forms of extra pay, e.g. charge-pay, specialist pay, Senior Engineer's allowance, First Lieutenant's allowance, Secretary's allowance, etc., are abolished.

Marriage allowance for officers, as for ratings, now varies only accord-

ing to rank and not according to size of family. The qualifying age is reduced from 30 to 25. Family allowances are payable under the provisions of the Family Allowances Act. The daily rates of marriage allowance are :

	£	s.	d.
Lieutenant-Commanders and lower commissioned rank .. .. .	..	12	6
Commanders and Captains of less than six years' service as such .. .. .	..	15	0
Captains with six or more years' service .. .. .	..	17	6
Rear-Admirals and higher ranks	1	0	0

It is a noticeable feature of most revisions of Service pay that, too often, what is given with one hand is taken with the other. So we find that marriage allowance to officers, as to ratings, is now to be taxable. The White Paper excuses this by saying that : " It is appreciated that the decision . . . will have a considerable effect on the net receipts . . . in that respect, however, the position of members of the Services will be assimilated to that of other members of the community. Special regard, moreover, has been given to these decisions as one of the factors in determining the new levels of Service emoluments." Again, this ignores the difference between the naval officer and the civilian, because the former, for a large part of his life, has to maintain a separate home.

Official Entertainment Allowances, exempt from taxation, are still payable to officers holding command appointments, as approved by the Admiralty. The rates of the allowances for officers above the rank of Captain R.N. were left by the White Paper " under consideration."

Broadly speaking, the pay of the Navy, in conjunction with the other two Services, has been improved, but the remuneration of the higher ranks, and of Flag Officers particularly, still compares very unfavourably with that in the Civil Service, while their responsibilities are usually incomparably greater than those attaching to comparable salaries in civilian life.

Improved rates of retired pay for officers were also established in the White Paper of March 6, 1946. Subject to the necessary qualifying years of service, these are :

Lieutenant	£375 a year
Lieutenant-Commander	475 "
Commander	625 "
Captain, under 6 years	825 "
Captain, after 6 years	900 "
Rear-Admiral	1,100 "
Vice-Admiral	1,300 "
Admiral	1,500 "

Admirals of the Fleet on half pay receive £1,800 a year. This is no lavish reward for the most distinguished officers in the Navy, some of whom have been made peers, at the end of their Service career. It invites comparison with President Truman's announcement of March 28, 1946, that the great commanders who had earned the newly-created rank of Fleet Admiral, together with the Generals of the Army, would receive " full war-time pay and emoluments for life, and thus would never be under the necessity of taking posts in business or industry. For once," said the President, " the Republic is being fair to the men who took the nation through a great world crisis."

The new scheme for retired pay does not apply to officers who were already on the retired list on December 19, 1945 ; but it was stated that consideration would be given to the position of retired officers who had given full-time service in the armed forces in the 1939-45 war.

Revised rates of pay for Royal Marine officers were announced in May. The new daily rates were :

General	160/-	Captain	32/-
Lieut.-General	135/-	Biennial increments to	42/-
Major-General	110/-	Lieutenant	13/-
Colonel	74/-	After 4 years	17/-
Lieut.-Colonel	65/-	Biennial increments to	26/-
Biennial increments to	71/-	Second-Lieutenant	7/6
Major	47/-	Second-Lieutenant, over 20	11/-
Biennial increments to	57/-		

R.M. officers' pay is related to that of R.N. officers, as it would not be equitable to equate the pay of an isolated R.M. rank with that of an Army officer of the same title.

PRIZE MONEY.

Although the announcement was made on December 19, 1945, it will be appropriate to place on record here that Prize Money is to be paid to the Royal Navy in respect of enemy ships and cargoes captured during the 1939-45 war. It had been decided, however, that this is the last occasion on which prize money will be paid. "There is a widespread feeling that it would suit modern conditions of service better for this historic relic to be assimilated into the normal grant of gratuities on future occasions," said the First Lord in making the announcement. The amount of the prize fund to be distributed was a matter for conjecture, as the Prize Court was still sitting and ships were still being condemned in prize. Unofficial estimates put the eventual total at about £20,000,000, as compared to about £14,000,000 in the 1914-18 war. It had been recognised that modern conditions made it unfair to distribute prize only to the actual captors of a ship, and it had been decided that all serving actively in the Navy should be included in the final distribution. The "variation in payments between ranks" would, said Mr. A. V. Alexander, be very much narrower. The Royal Air Force, more particularly Coastal Command, is to be eligible for consideration in the share out.

POST-WAR OFFICERS.

With the return to peace-time conditions and the drastic reduction of ships in commission, Regular officers, for whom the Navy represents their life's career, naturally became apprehensive that they would suffer the same fate as so many after the 1914-18 war and find themselves the victims of wholesale "axing." This fear was allayed to some extent by an Admiralty announcement, on June 1, that "so far as can be seen at present, there is no prospect of any permanent officers being 'axed.' . . . On the contrary, when requirements are more accurately known, it will probably be necessary to introduce a scheme of short-service commissions for certain Reserve officers who volunteer to assist in filling the gap likely to exist during the next few years between the number of permanent officers on the active list and the number of officers required to meet commitments." This was reassuring for the less senior officers; but it was obvious that the number of commands of fleets, squadrons, and ships must be so reduced that there would be increasing uncertainty of employment in the higher ranks.

Certain branches of the Service which had been largely manned by R.N.V.R. and temporary officers and ratings during the war had to be put

on a more permanent footing. The most important of these was the Naval Air Branch, which, it was estimated, was likely to represent one-third of the total naval man-power in future. So, on September 14, the Admiralty announced a new scheme for manning naval aircraft. Under this, the majority of pilots were to be ratings, whereas hitherto the majority had been officers. The remainder would be R.N. and R.M. officers trained for the dual functions of pilot and observer. Rating pilots would be mainly recruited from civil life; a small proportion would be recruited from aircraft artificers and Royal Marines for temporary flying service, and a few ratings from other branches would be allowed to transfer. Only continuous service rating pilots and those hostilities-only rating pilots accepted for an extended service engagement would be transferred to the new pilot rates. These latter and their daily rates of pay were as follows:

						s.	d.	
Probationary Pilot	..	..	..	..	..	7	0	during flying training.
Pilot IV	..	..	..	..	..	10	6	
Pilot III	..	..	..	..	..	12	6	
Pilot II	..	..	..	..	..	14	6	
Pilot I	..	..	..	..	..	16	6	

Rating pilots would be eligible for promotion to Warrant Officer and to Commissioned Officer in the Executive branch.

The very great increase in the amount and complexity of electrical equipment in H.M. Ships had led to the creation of a new specialist branch, known as the "L" branch. The establishment of a permanent school at Fareham has already been alluded to. Eventually all officers joining this branch will receive six years' training, the first three to be spent at Cambridge University, where the first group had already begun to study. Ratings for the branch are to be drawn from general service entries.

Two long-established branches, which had been dependent largely on temporary officers during the war, required special measures to make good losses from demobilisation. A limited number of permanent commissions in the Engineering branch were therefore offered to officers who had held commissions as temporary R.N.(E.) or R.N.V.R.(E.) officers and to R.N.V.R.(A.) officers who had been employed on air engineering duties. Similarly, a limited number of permanent commissions in the Supply and Secretariat (formerly Paymaster) branch were offered to permanent and temporary officers of the R.N.R. and R.N.V.R., who had been released, and who were between 22 and 82 on September 1, 1946, and who had carried out a minimum of three years' mobilised service, including one year as an officer.

The Royal Marines also opened their commissioned ranks to a limited number of temporary officers. Among the conditions of transfer to permanent service were that officers must have had a minimum of six months' commissioned service and have been first commissioned as temporary Second Lieutenant not later than their 22nd birthday. Officers first commissioned between their 22nd and 23rd birthdays could be specially considered on their service records and individual qualifications.

It was announced, on June 26, that grants from public funds up to a maximum of £150 could be made to impecunious parents of successful candidates in the Special Entry examination for Naval Cadetships. In future, it was stated, no candidate should be prevented by lack of means from joining the Navy as a Special Entry Cadet. A Combined Entrance Examination was instituted for Naval Cadets (Special Entry) for entry to

the Royal Military Academy, Sandhurst, and to the Royal Air Force College, Cranwell. The first of these competitions, conducted by the Civil Service Commission, began on December 10, 1946.

ROYAL NAVAL VOLUNTEER RESERVE.

On October 1 it was announced that the Admiral Commanding Reserves was reconstituting the permanent R.N.V.R. Divisions authorised before the war. The Divisions with their headquarters are :

LONDON, H.M.Ss. President and Chrysanthemum.
 SUSSEX, R.N.V.R. Batteries at Hove and Newhaven.
 SEVERN, H.M.S. Flying Fox (Bristol).
 MERSEY, H.M.Ss. Eaglet (Liverpool) and Irwell (Birkenhead).
 CLYDE, Headquarters (Govan) and H.M.S. Carrick (Greenock).
 ULSTER, H.M.S. Caroline (Belfast).
 FORTH, H.M.S. Claverhouse (Leith).
 TAY, H.M.S. Cressy (Dundee).
 TYNE, H.M.Ss. Calliope (Newcastle) and Satellite (S. Shields).
 HUMBER, Headquarters, Hull.
 SOUTHAMPTON, Headquarters not yet established.

Some of the ships might be replaced by more modern vessels and the existing ships were to be refitted and given modern equipment. The R.N.V. (Wireless) Reserve was being reconstituted, with centres at inland cities and towns, for training officers and telegraphist and radio mechanic ratings. It was stated that it would not be possible to absorb into the R.N.V.R. all temporary officers who had volunteered for transfer ; but officers who could not be accepted would be offered commissions in the Royal Naval Volunteer Supplementary Reserve.

The re-establishment of the R.N.V.S.R. was announced by the Admiralty on August 21. It was opened to any officer who had held a temporary Commission in the Royal Navy, the Royal Naval Reserve, or the Royal Naval Volunteer Reserve since September 2, 1939, who wished to maintain his connection with the Navy and who volunteered for naval service in the event of any future emergency. Those enrolled will not serve in peace, but will be required to undertake to report as ordered on receiving a calling up notice. They can retain their war service rank on all occasions and are entitled to wear uniform on occasions of state and ceremony.

RECRUITING.

A recruiting campaign for voluntary normal regular service and short service was inaugurated on May 16 for all H.M. Forces. Referring to the Navy's needs, the Parliamentary Secretary to the Admiralty said that whatever might be the future of conscription, men entering under that system could neither provide crews for ships on foreign stations nor the long experience and technical qualifications required for the higher ratings. The Navy in peace-time must rely on its system of long-term voluntary engagements, as in the past. A four-year engagement would bring a total of £125 in bounty and gratuity, plus £8 for a civilian outfit.

An inducement to men already serving to extend their service was offered by an Order in Council of May 15, which sanctioned bounties and gratuities to those who undertook to do so or who rejoined under special

arrangements. "Hostilities only" naval ratings and Royal Marines who extend their service by three or four years were to receive a bounty of £33 and a gratuity of £25 for each full year of extended service. A similar offer was made to regular and "hostilities only" men who had taken their discharge, except that, if they had received their civilian clothing benefits, the bounty was only £25.

It is not often that there is a reversion to old titles in the Navy, but an instance of this was brought about by an Order in Council of May 15, when the titles of Gunner's Mate and Torpedo Gunner's Mate were changed to Gunnery Instructor and Torpedo Instructor respectively. It had been found that the use of the term "mate," which had a very different construction in industry, seriously handicapped senior naval ratings when applying for civilian employment. As a matter of history, this was the second time that this change had been made in the case of the Gunner's Mate; for before 1886 this was the title of Petty Officers trained as instructors in gunnery. In 1886 it was altered to Gunnery Instructor and so remained until 1910, when the original title was brought in again. When the Torpedo School was first started in 1873 as part of the Gunnery School, men were trained as instructors in both gunnery and torpedo, and on qualifying wore a badge with a crossed gun and torpedo. The Gunnery Instructors had the gun superimposed on the torpedo, and the Torpedo Instructors the torpedo superimposed on the gun. With the final separation of the two Schools in 1876, a distinctive badge was adopted for each class of specialist rating.

WOMENS' ROYAL NAVAL SERVICE.

It was decided that the W.R.N.S. would not be completely disbanded, as was done after the 1914-18 war; but that it would remain, although much reduced in numbers, as a permanent branch of the Navy. Permanent service in the W.R.N.S. would be introduced in due course and the categories to be maintained included Cook, Educational Vocational Training Instructor, Hairdresser, Mess Caterer, Motor Transport Driver, Quarters Assistant, Regulating, Switchboard Operator, Welfare Worker, Writer (Pay, General, and Shorthand), Steward, Clothing, Cinema Operator, Signal Distribution Office Watchkeeper, Teleprinter Operator, Victualling, Wireless Telegraphist, Aircraft Direction, Naval Airwoman, Air Stores, Meteorological, Radio Mechanic, and Range Assessor.

Meanwhile, the terms for temporary extended service were announced in mid-November. This was open to all officers and ratings of the W.R.N.S. who had completed one year's service. Those accepted for it would be able to apply for permanent service when it is introduced. It was announced that vacancies existed for new recruits who volunteer for Clerical, Technical, Cook, and Steward categories. Enrolment would be for three years.

On November 22 Dame Vera Laughton Matthews, who had been Director of the W.R.N.S. throughout the war, was succeeded by Superintendent J. M. Woolcombe, who had been Deputy Director since the previous May.

NEW CONSTRUCTION.

As has been mentioned, the end of the war caused a drastic cancelling of orders for new warships, and it was inevitable that financial stringency

and the need to survey the duties of the Navy in a future war in the light of new forms of offence would combine to halt new construction. Nevertheless certain ships were so far advanced that it was expedient to complete them. Notable among these was the aircraft carrier *Eagle*. This, the largest vessel of her type, was launched by H.R.H. Princess Elizabeth on March 19 from the Belfast Yard of Messrs. Harland and Wolff. Building had been retarded by higher priorities, but this delay enabled improvements to be made, and it was claimed for the *Eagle* that she would embody the latest experience of the war. Originally intended to be called the *Audacious*, this was the first of a new "Ark Royal" class of carriers of four ships. But two contracts were cancelled, and the only other ship of the class which was still due to take the water was the new *Ark Royal*, building in the Birkenhead shipyard of Messrs. Cammell Laird. It is understood that these will be the largest carriers yet built for the Royal Navy and that their displacement will considerably exceed the 30,000 tons (full load) of the "Implacable" class.

The last two ships of the seven 18,000-ton light fleet aircraft carriers of the "Colossus" class, the *Theseus* and *Triumph*, were completed early in the year. The *Triumph* was commissioned for trials on April 9. The *Leviathan*, of the very similar "Majestic" class, was towed from Messrs. Swan Hunter's yard on the Tyne to Portsmouth in July, while still in an unfinished stage; she was to be completed in the Royal Dockyard when possible. Two other ships of this latter class were transferred to the Royal Canadian Navy; these were the *Magnificent* and *Warrior*, of which the latter was commissioned at Belfast on January 24, by Captain F. L. Houghton, R.C.N. She was the first aircraft carrier to be operated by a Dominion Navy and has been lent by the Admiralty for the training of a Canadian naval air arm.

H.M.S. Scorpion, launched from the yard of Messrs. J. Samuel White and Co. at Cowes on August 15, was an example of the all-welded construction adopted for destroyers. This system had been specially developed by that firm in agreement with Admiralty policy and is likely to become the standard practice for destroyers. Welding instead of rivetting is also being used increasingly in the construction of other classes of warships. In the case of these new destroyers, extensive use was made of prefabricated construction, based on a system of continuous transverse and vertical welds completely girdling the ship, the bulk of the material being of special high-tensile quality steel. As high a proportion of welding as possible is done in the shops, where work will not be interrupted by weather or, under war conditions, by the inconveniences of black-out, and assemblies are of the largest size compatible with the space and facilities available. The building berths at Cowes have been furnished with 8-ton cranes for transporting and placing the fabricated units. Other new ships completed during 1946 were:

DESTROYERS—*Chivalrous*, *Comus*, *Concord*, *Crispin*, *Creole*, *Cromwell*, *Saintes*, *Cadiz*, *St. James*, *Sluys*, *Vigo*, *Gravelines*, *Gabbard*, *Aisne*, *Barrosa*, and *Dunkirk*.

SUBMARINES—*Teredo*, *Tabard*, *Aurochs*, *Aeneas*, *Alaric*, *Aloide*, *Alderney*, and *Affray*.

SLOOPs—*Snipe*, *Sparrow*, *Acteon*, and *Nereide*.

FRIGATE—*Loch Veyatie*.

DESPATCH VESSELS—*Surprise*, and *Alert*.

Refits and adaptions carried out during the year included the conversion of the battleships *Revenge* and *Resolution* to training ships and the fitting out of the *Devonshire* as a training cruiser for Cadets.

The *Ramillies* replaced the old wooden ships *Implacable* and *Foudroyant*, which had been used temporarily as training ships at Portsmouth during the war, and they have been handed back to the Society for Nautical Research.

In all new construction special efforts were being made to improve the living conditions of ship's company. Generally speaking, many of these improvements were along lines adopted long ago in the American Navy. The equipment for cooking, baking, bathing, and washing clothes is being modernised and, where possible, space is provided for reading and recreation separate from the feeding and sleeping messes. This principle was carried a stage further in the largest ships, notably the newest battleship, *H.M.S. Vanguard*, where a dining-hall was provided. All but the smaller ships now have a fully equipped cinema theatre. In some of the larger ships the cafeteria system of serving meals has been started. Other amenities being introduced were soda fountains and ice-cream machines; also facilities for tailoring, boot-repairing, dry cleaning, and hair-dressing.

The introduction of all these comforts into a fighting ship has, of course, involved many very serious problems in design, especially as they have had to take their place with the ever-increasing new equipment, such as radar, with the additional accommodation for the officers and men to work it, while the demands for higher speed and better protection never cease. The effect must be to send up tonnage in relation to armaments to a very marked degree. So we see the *Vanguard*, with eight 15-inch guns, displacing 42,500 tons, as compared with the *Nelson*, with nine 16-inch., displacing 33,950 tons; the "*Tiger*" class cruisers, with nine 6-inch guns, displacing 8,885 tons as against the "*Leander*" class of 7,270 tons, carrying only one less gun of the same calibre; while the "*Battle*" class destroyers of 2,325 tons carry only four 4.5-inch guns in addition to their torpedo armament, as compared with the older "*Javelin*" class of 1,760 tons, carrying six 4.7-inch, with a similar number of tubes.

Although it was the policy to modernise older ships of the Navy which are being retained for further service, so as to improve living conditions, there were limitations to the extent to which this could be done, for the mass of additional equipment piled into them since they were originally designed and the accompanying increase of complements had, in many cases, caused such serious overcrowding that there was no space available for such novelties as dining-halls.

For diplomatic reasons or because they were regarded as superfluous to peace-time requirements, a number of H.M. Ships have been transferred to foreign Powers. Notable among these was the new aircraft carrier *Colossus*, handed over on loan to the French Navy by the Prime Minister, Mr. Atlee, with much ceremony at Portsmouth on August 8. Her new ship's company was brought over from France in the battleship *Richelieu*, and the opportunity was taken for thirty officers and 330 ratings from the battleship to visit London, where they were entertained by the Lord Mayor and Corporation.

In September 1946 the submarines *Venturer*, *Votary*, and *Viking* were transferred to the Royal Norwegian Navy, and renamed the *Utstein*, *Uthang*, and *Utvær*. The following month the destroyers *Cromwell*, *Crystal*, and *Croziers* were also made over to Norway.

Holland has acquired two ships from the Royal Navy, the escort carrier *Nairana* (re-named the *Karel Doorman*), and the destroyer *Scorpion* (now the *Kortenaer*). Both vessels visited Portsmouth in August.

Two of three British submarines which Denmark had leased for three years, the *Vulpine* and *P.52*, arrived at Copenhagen on September 7. The Danish Navy has the option to purchase these craft when the lease expires.

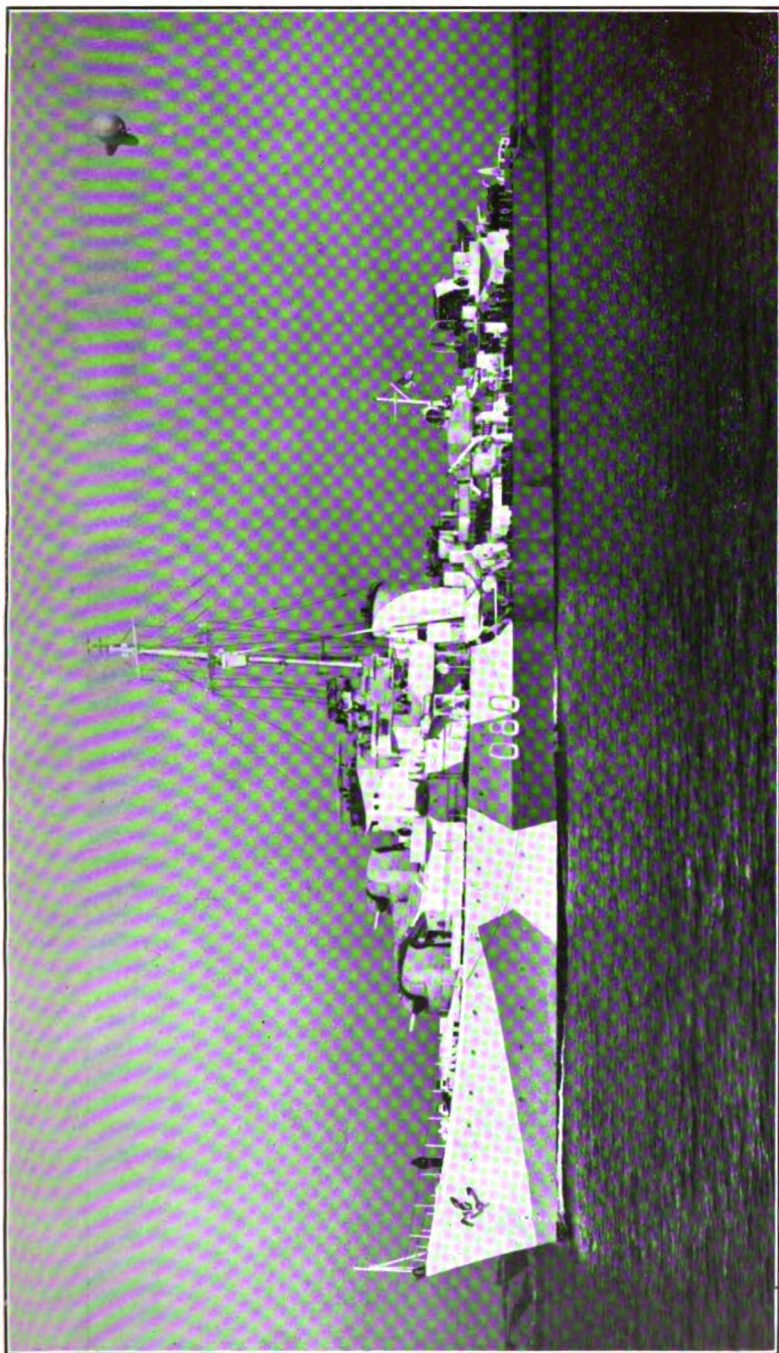
In May the Government of Eire purchased three of H.M. Ships, the corvettes of the "Flower" class *Belwort*, *Borage*, and *Oxlip*.

H.M.S. WARSPITE.

Doubtless the Admiralty cannot afford to be sentimental about old warships, however famous, but it was sad to see a ship with such a grand record of service as the *Warspite* consigned to the scrap heap. One of the finest units of the Grand Fleet of 1914-18 and a veteran which had survived heavy scars at the battle of Jutland, she had added many successful engagements to her roll of honour in the late war. In 1939 she was Admiral Sir Andrew Cunningham's flagship in the Mediterranean; but was sent home in November to become flagship of the Commander-in-Chief Home Fleet, Admiral Sir Charles Forbes. In April of the following year she was flying Vice-Admiral Whitworth's flag in the raid on Narvik. July 9 found her back in the Mediterranean, again flying the Commander-in-Chief's flag, and taking part in the engagement with the Italian fleet off the south coast of Calabria. Three days later, while covering a convoy on passage from Malta to Alexandria, she was attacked twenty-two times by aircraft, nearly 300 bombs being aimed at her without damage.

In December 1940 the Commander-in-Chief in the *Warspite*, with the *Valiant*, entered the mouth of the Adriatic to bombard Italian concentrations at and around Valona, in Albania. The following spring, she was again Sir Andrew Cunningham's flagship at the Battle of Matapan on the night of March 28-29, 1941, when her first broadside of six 15-inch hit an 8-inch Italian cruiser, which burst into flames. A third broadside of eight set a similar target on fire.

During the battle for Crete in May, the *Warspite* was hit by a bomb and after returning to Alexandria was again damaged by a near miss. Nevertheless she was able to make her way through the Red Sea to Singapore and so to Esquimalt to dock and refit. In March 1942 she had become flagship of the Eastern Fleet; but by July of the following year she was actively engaged again in the familiar waters of the Mediterranean as flagship of Rear-Admiral Bisset, commanding Force H. in the bombardment of Catania. September found her supporting the U.S. Fifth Army at Salerno and subsequently in the Altavilla area. Here she sustained serious damage in a glider-bomb attack. On her way to Malta in tow of tugs she became so unmanageable that she passed through the Messina Straits broadside on. Eventually she reached Gibraltar for docking and repairs. After further repairs at Rosyth she was ready for D-Day and played a very effective part in the invasion of Normandy. From there she was on her way north when she struck a mine in the Straits of Dover; but she reached Rosyth safely. After speedy repairs, she was in action again off Brest by the end of July. She finally distinguished herself by doing great execution against the German defences of Walcheren Island during the operation for the opening of the Schelde. So ended the war record of this grand old battleship.



H.M. Destroyer Opportune.
(Courtesy of Messrs. Thornycroft.)



H.M. Submarine Teredo.
(*Courtesy of Messrs. Vickers-Armstrong.*)

Another famous ship consigned to the scrap-heap was H.M.S. Iron Duke, which wore Jellicoe's flag at the battle of Jutland and throughout his command of the Grand Fleet in the 1914-18 war. Having suffered bomb damage at Scapa Flow early in the late war, she was beached there and acted as a depot ship. In August 1946 she was refloated and taken to Gareloch to be broken up at Faslane.

The light cruiser Cardiff, also a veteran of the Grand Fleet, and which in 1918 led the German High Sea Fleet to surrender, and the destroyer Scout, the oldest of her class, completed in 1918, were also due to be scrapped. The only survivor of the first two 15-inch monitors, the Marshal Soult, went to the shipbreaking yard at Troon in August, leaving the Erebus as the sole representative of the big monitors which were the backbone of the Dover Patrol from 1915 to 1918.

H.M.S. VANGUARD.

In March, it was announced that when the King and Queen and the two Princesses went to South Africa, they would travel in H.M.S. Vanguard. On May 12, Princess Elizabeth, who had launched the ship in 1944, attended the commissioning service at Greenock. The Vanguard, commanded by Captain W. G. Agnew, R.N., arrived at Portsmouth on August 16 to fit out for the Royal tour. The quarters on the shelter deck, originally designed for an Admiral and his staff, were adapted for the Royal accommodation. The King, the Queen, and the Princesses each had their own suites, with their personal staff in close attendance. Their Majesties each had a roomy day cabin and there was a large dining cabin. Some of the furnishings came from the Royal yacht Victoria and Albert, others were specially made. The general colour scheme was chosen by H.M. the Queen. The Vanguard left Portsmouth on December 4 for a shakedown cruise, returning in time for Christmas leave.

H.M.S. TRIUMPH VISITS RUSSIA.

A notable courtesy visit to a foreign Power was that made by Admiral Sir Bruce Fraser to the Soviet Union to attend the celebration of Red Navy Day in Moscow on July 28. Admiral Fraser embarked in the new aircraft carrier Triumph, Captain H. W. Faulkner, which was accompanied by the destroyer Rapid, Lieutenant D. P. Willan. The vessels arrived at Kronstadt on July 26, where shore leave was given to Leningrad, 20 miles distant; the attractions of this were somewhat marred by the continuous and close escorting of the British naval visitors. In Moscow, Admiral Fraser received the Order of Suvarov, First Class, for his successful operations in securing the passage of allied convoys to the U.S.S.R., and also the sinking of the Scharnhorst.

ALBANIA'S "DELIBERATELY HOSTILE ACT."

A squadron of the Mediterranean Fleet, consisting of the cruisers Mauritius and Leander and the destroyers Saumarez and Volage were steaming through the North Corfu Channel to carry out exercises with the aircraft carrier Ocean, when on October 10, the two destroyers were mined. The Saumarez, Captain W. H. Selby, struck first and began settling down by the bow with oil fuel forward alight. The Volage took her in tow stern first; but an hour and a half later, she also struck a mine. Both ships

were towed into Corfu next morning, but forty-four officers and men lost their lives, and about the same number were injured. It was subsequently stated in Parliament that at the time the ships were in the very centre of the swept channel, which was a mile wide, and about $1\frac{1}{2}$ miles from the Albanian coast. The channel had been searched by British minesweepers periodically from October 1944 to February 1945 and no mines had been found. Since then it had been used by naval vessels of various sizes, and also by merchant ships. While the damaged ships were endeavouring to extricate themselves, a boat flying the Albanian ensign and a white flag went alongside the *Volage* to ask what the ships were doing. Apart from this no action was taken by the local authorities.

On October 30, it was announced that the Albanian Prime Minister had sent a message to the United Nations protesting against what he termed "unauthorised penetration of British warships into Albanian waters," and demanding an intervention from the Secretary General to put an end to such provocations. As a very proper sequel to such effrontery, minesweepers of the Royal Navy, acting under international authority, on November 13 swept the Channel and brought up 22 mines. This brought forth another Albanian protest against Britain's "dictatorial" act! Two of the mines were taken to Malta for expert examination and the Admiralty stated, on November 21, that all the mines swept up were of German manufacture, and had been in the water less than six months.

After a thorough examination of the evidence, the British Government, on December 10, sent an emphatic Note to the Albanian Government demanding reparation for the damage suffered by the British destroyers and full compensation for the relatives of the officers and men who had lost their lives. The Note accused Albania of a "deliberately hostile act," and said that if no satisfaction was received within fourteen days the matter would be brought before the Security Council of the United Nations as a serious threat to, and breach of, international peace and security. The reply received, within the time limit, was regarded as entirely unsatisfactory and Great Britain duly placed her case against Albania before the Security Council of the United Nations under Article 35 of the Charter.

MISCELLANEOUS EVENTS.

Throughout the year the immense task of clearing the seas of mine-fields laid during the late war was continued. An Admiralty announcement at the end of March said that over 12,000 mines had been swept since VE-Day in European waters alone, more than half of them by British minesweepers. In British waters, only British minesweepers were at work; they were also helping in Dutch, Belgian, Mediterranean, and, in a supervisory capacity, in German waters. An International Organisation, initiated by the Admiralty and with a Control Board in London, and employing 1,900 minesweepers of many nations, had cleared 125,000 miles of sea by the end of the year. The Royal Navy had no casualties, either of ships or crews in the course of these sweeping operations; but since May 1945 180 merchant ships of all nationalities had been sunk or damaged by mines. More than 95 per cent. of these losses were due to vessels sailing outside special channels and areas and ignoring published advice.

The growth of London, with the attendant impurity of the atmosphere and lightness of the sky at night, had been increasingly interfering with astronomical observations from the Royal Observatory at Greenwich for

many years ; and on April 12 the Admiralty announced that this establishment would be removed to Hurstmonceaux Castle in Sussex. In commemoration of the tercentenary of the great scientist and mathematician a special building to be called the Isaac Newton Observatory, which will house a 100-inch telescope, is to be built in the grounds. The removal will not involve any change in the position of the prime meridian of Longitude, which was fixed by international agreement.

Bird watching is to be officially encouraged in the Royal Navy, and an Admiralty statement made known that, if support is adequate, a R.N. Bird Watching Society will be formed.

E. ALTHAM.

CHAPTER III.

FOREIGN NAVIES.

So far as the lately allied navies are concerned, developments in 1946 were chiefly in the direction of reversion to peace-time status. In the enemy-occupied countries, whose resources in the way of dockyards, shipbuilding, and armament manufacturing establishments had suffered considerably, this process involved more or less extensive reorganisation. In the United States inevitable reductions in naval personnel have involved paying off a large proportion of the ships that made up the formidable fleets in commission in 1945. While a great many have been laid up in reserve, almost all the older vessels, with a substantial percentage of those built for special war requirements, have been sold for scrap or for conversion to mercantile use.

Almost everywhere naval construction is proceeding at a slow pace. Though this is mainly to be accounted for on financial grounds, experiments with new weapons and the careful study of the large amount of technical data found in enemy archives have also had some influence in the matter.

In South America there is evidence of something approaching a general tendency to take stock of the naval material at present in service with a view to its gradual replacement by more modern construction. This is chiefly apparent in the three principal navies, those of Argentina, Brazil, and Chile. In the past all three of these republics have frequently sought the co-operation of the British shipbuilding industry in renewing their tonnage. Whether the same well-founded practice will be followed in 1947 may depend upon whether preference is given to entirely new designs, intended to meet the special requirements of each country concerned, or upon whether the counter-attractions offered by second-hand vessels, which after war service are for sale at bargain prices, prove stronger.

It seems unlikely that the atom-bomb experiments at Bikini will have any influence in deterring nations from building new warships. The effect has rather been to encourage the intensive study of the joint problems of designing ships able to withstand the shock of atomic explosion and of dispersing bases and shipyards at widely separated points so that they may not be liable to simultaneous destruction.

UNITED STATES.

For the fiscal year from July 1, 1947, to June 30, 1948, the total appropriations for the United States Navy amounted to \$4,119,659,800, or approximately \$20,000,000,000 less than for the preceding twelve months. At the end of 1946 the personnel on duty comprised 54,851 officers and 436,812 men, substantially below the post-war target figure of 550,000 officers and men. These figures include the United States Marine Corps, but not the Coast Guard, which has been returned to Treasury control.

On June 6, 1946, President Truman nominated Mr. John L. Sullivan (previously Assistant Secretary of the Navy for Air) to the post of Under Secretary of the Navy, rendered vacant by the resignation of Mr. Artemus

L. Gates. Mr. W. John Kenney was simultaneously appointed Assistant Secretary of the Navy.

On September 24, 1946, it was announced that Admiral John H. Towers was being relieved as Commander-in-Chief of the Pacific Fleet by Admiral Louis E. Denfield, previously Chief of Naval Personnel. The Commander-in-Chief of the Atlantic Fleet is now, in consequence of the death of Admiral Marc A. Mitscher, Admiral W. H. P. Blandy.

As from January 1, 1947, the system of numbered fleets, established during the war, is being abandoned. Instead, the operating forces of the Navy are being reorganised in two task groups, the strength of which will vary according to needs. The flag officers commanding these groups will be responsible to the Commanders-in-Chief of the Atlantic and Pacific Fleets respectively. The Pacific and Atlantic commands are at the same time to be broadened so as to include other organisations for purposes of administration.

Commands over which the Commander-in-Chief, Pacific Fleet, will have administrative control are : Naval Forces, Western Pacific (Admiral C. M. Cooke), and Naval Forces, Japan (Vice-Admiral R. M. Griffin). In the case of the Atlantic Fleet, they are Naval Forces, Europe (Admiral R. H. Connolly), and Naval Forces, Germany (Rear-Admiral R. E. Schuirmann). Inactive ships will be assigned to the Atlantic and Pacific Reserve Fleets, commanded by Admiral Thomas C. Kinkaid and Admiral Richard S. Edwards respectively.

The office of Deputy Chief of Naval Operations for Special Weapons (hitherto held by Admiral Blandy) has been abolished. Guided missile development, which came under this section, has been assigned to Rear-Admiral D. V. Gallery in the guided missile section of the Air division. Similar responsibility for atomic defence devolves upon Rear-Admiral William S. Parsons, who was Admiral Blandy's deputy in charge of technical research during the Bikini experiments ; while Rear-Admiral Jerauld Wright takes over fleet requirements for new developments other than those concerned with aircraft, atomic energy, and guided missiles.

In September last it was intimated that the Navy proposed to dispense with a dozen or more of its fifty-three overseas bases in conformity with the decision to reduce expenditure. Though no complete list of bases to be given up has appeared, it is understood that Eniwetok and Majuro, in the Marshall Islands, are likely to be abandoned. Truk will be reduced to a care-and-maintenance basis, as will Ulithi, Peleliu, and Manus. The last-named, it may be observed, is in the British Admiralty group, north-west of New Britain. Proposed expansion of Guam into a second Pearl Harbour is held up for the time being, though its importance continues to be emphasised. A new permanent naval base at Kodiak, in the Aleutian Islands, has been planned. Generally, it is the policy to concentrate permanent naval establishments in Alaska, the Aleutians, Hawaii, and the Marianas.

For some time past discussions have been proceeding with the Philippines Government for the establishment of bases in the southern islands of the group, from Leyte Gulf to Mindanao. While agreeing on the broad lines of this proposition, the Philippines authorities have raised various questions of detail concerned with administration, etc., which are likely to take some months to settle.

Early last year the Surplus Property Administration recommended to Congress that the Navy should keep in commission twenty-five new ship-

yards and facilities in a dozen privately owned yards. In pursuance of this policy it was announced in November that the Navy had completed negotiations for the acquisition of the Cramp Shipbuilding Company's property at Philadelphia, comprising a shipyard extending over 65 acres. These shipbuilding facilities were deemed "essential to the national interest, to be held available for a possible future emergency," though the leasing of the yard to private interests was not debarred. During the war the Government had invested some \$22,000,000 in this undertaking and now sought to protect its interest.

A committee of the Army and Navy Munitions Board was last year surveying underground sites with a view to putting some of the nation's key plants and headquarters underground as a precaution against atomic or rocket attacks in a future war. A study is being made of the possible usefulness in this connection of such vast underground areas as the Mammoth Caves in Kentucky and the Carlsbad Caverns in New Mexico. During the late war a beginning was made in reducing the vulnerability of munitions industries by dispersing as widely as possible all new explosive and aircraft manufacturing plants.

Further details of the system of preserving laid-up ships from corrosion have been released. According to the latest estimate, the average cost of placing a fighting ship in a state of preservation by this method is about \$10,000, the time occupied being about six months. The maintenance cost per annum for 4,000 vessels, exclusive of personnel pay, is reckoned to be about \$4,000,000. The purchase price of dehumidification machines is about \$1,500 each and the cost of their operation about a dollar a day per machine. A 10,000-ton cruiser would require three such machines and one of the large battleships might need six.

Actually five methods are in use by the Navy to protect its reserve ships against deterioration: (1) Dynamic dehumidification, using machines which draw in humid air over and through beds of silica gel or activated alumina and send out dry air to sealed compartments. (2) Static dehumidification, accomplished by the use of desiccants without the mechanical circulation of air. It is used for small boats and for special items in packages, as well as in places which cannot be served by the dynamic method. (3) Strippable plastic is used for "packaging." To make sure that this is performed properly, the Navy conducts a plastic coating spray school at the Philadelphia Navy Yard. The length of the course is two weeks. (4) Use of anti-fouling hot plastic paint and other paints. (5) Three grades of thin rust preventive compounds are used. Grade 1 prevents the formation of tarnish and verdigris on copper, brass, and bronze surfaces. It is used to cover stowed wire rope and other ferrous materials. It dries within twenty-four hours, and can be removed, when desired, by any hydrocarbon solvent. Grade 2 is used to cover ferrous and other metal surfaces which are stowed under cover. It remains tacky for about four months. Grade 3 is used on ferrous and other corroddible metal surfaces which under normal operation are in contact with steam or water, such as the interiors of water jackets, turbines, piping, and boilers. It is used where it will displace residual moisture with a protective film by forming into an emulsion with the moisture.

The routine of making tests, inspections, and maintenance work on the various parts of the laid-up vessels is spread out over the year. An elaborate system of records and reports has been established to keep a close check on all phases of inspections, adjustments, and maintenance.

In the Third Naval District more than half of the thousand ships earmarked for preservation had arrived at eight east-coast ports and were in various stages of inactivation by June 1, 1946. These ports are Boston, New London, New York, Philadelphia, Norfolk, Charleston, Green Cove Springs (N. Florida), and Orange (Texas). When the preservation work is completed there will be laid up in these ports 5 battleships, 3 battle cruisers, 5 fleet carriers, 5 light fleet carriers, 9 heavy cruisers, 10 light cruisers, 30 escort carriers, 109 destroyers, and 54 submarines, with hundreds of subsidiary vessels and landing craft. To keep this fleet in reserve status will cost, it is estimated, a total sum of \$3,812,600 a year, exclusive of the pay of personnel, amounting to 1,155 officers and 13,441 men. This laying up is officially referred to by the Navy as "Operation Zipper."

Further economy was involved in the suspension on August 31 of work on six ships under construction in naval shipyards. These were the fleet carrier *Oriskany*, of 27,100 tons, at New York; the destroyer tender *Bryce Canyon* at Charleston; the destroyer-escorts *Vandivier* and *Wagner* and a landing ship (tank) at Boston; and the battleship *Kentucky* at Norfolk. Construction of eleven ships building in private yards will not be stopped, but will proceed at a somewhat slower rate. In addition, work on the hull of the battle-cruiser *Hawaii*, of 27,500 tons, will be delayed to avoid unnecessary expense while changes are being developed in her design; but the New York Shipbuilding Corporation is to be allowed to complete her main propulsion plant, instal electric power and lighting facilities in the machinery spaces, and continue other work.

As 23 of the remaining 24 ships out of a total of 41 under construction were scheduled for completion by December 1, 1946, it was considered that any delays at this stage would merely result in increased costs, so it was decided to complete them as originally scheduled.

This was followed a couple of months later by an order holding up all alterations to ships except for essential work, as part of the economy programme arising from budget cuts. It was directed that any alterations that could be defined as changes in the characteristics of a vessel were to be stopped unless they affected the immediate safety of the ship or if classed as essential or emergency requirements. Repair work was not affected by this order.

It was announced in December that it had been decided, as a further economy, to place the 45,000-ton battleships *Wisconsin* and *New Jersey* on reserve status as from the New Year. At the same time the two 35,000-ton battleships *Washington* and *North Carolina*, from the reserve fleet, would be laid up for preservation. Thus only two battleships would remain in full commission, the *Iowa* and *Missouri*.

The extent to which the two principal fleets had been reduced was disclosed by the Secretary of the Navy at the end of last year. The active Pacific Fleet then included 1 battleship, 6 fleet carriers, 8 heavy and 13 light cruisers, 6 escort carriers, 76 destroyers, 16 destroyer-escorts, and 89 submarines. In the Atlantic Fleet the ships in full commission were 1 battleship, 6 fleet carriers, 4 heavy cruisers, 4 escort carriers, 67 destroyers, 14 destroyer-escorts, and 41 submarines. Operating aircraft at the same date numbered just over 8,000. It is believed these figures have since undergone further reduction.

Bases in full operation on December 31, 1946, comprised twelve in the United States and an equal number overseas. There were also eight overseas bases classed as inactive.

In April 1946, President Truman embarked on a week's cruise in the new 45,000-ton aircraft carrier Franklin D. Roosevelt, flagship of the Commander-in-Chief, Atlantic Fleet, Admiral Marc A. Mitscher. Various exercises were carried out off the Virginia Capes, including an air attack on the flagship by twenty-five Helldiver bombers from the sister ship Midway. The President was accompanied by his Chief of Staff, Fleet Admiral William D. Leahy, and by the Chief of Naval Operations, Fleet Admiral Chester W. Nimitz.

On July 1, 1946, the Naval War College at Newport, Rhode Island, resumed full-length senior and junior courses, with approximately 115 students from the Navy, Army, Marine Corps and Coast Guard. It is officially stated that these courses stressed new developments in weapons, techniques, atomic energy, logistics, communications, electronics, strategy, tactics, international relations, and military government. Lectures and discussions by outstanding civilian experts in the fields of economics, history, finance, psychology, national policy, foreign relations, and scientific research and development were included. Several lectures were delivered by officials of the State Department on foreign affairs. Lessons of the late war were analysed as a guide to the future, and experiments were made with an "electronic manoeuvre board" designed to simulate realistically the movement and control of ships, aircraft, submarines, and guided missiles, and to correspond with reasonable closeness to the time elements involved in a naval action.

About seventy-five officers were included in the senior class. In the junior class were about thirty commanders and senior lieutenant-commanders of the Navy and ten Army officers of similar seniority. All naval officers assigned to the classes were chosen by a selection board recently convened in the Navy Department. About 40 per cent. of the officer students were aviators.

The full-length courses run for about eleven months. As soon as the necessary facilities are available, the number of students will be increased. Owing to curtailment of service educational facilities during the war, the new classes will cover a wider range in seniority. In due course the junior class will be expanded into a Staff and Command School, and all student officers in the senior course will ultimately be graduates of the school, while all naval student officers at the National War College (corresponding in some respects to our Imperial Defence College) will be graduates of the senior course.

On July 1, also, a new institution, the Naval Intelligence School, was opened with an initial enrolment of fifty-five officers of the Navy, Naval Reserve, and Marine Corps. These officers are intended to be the nucleus of a comprehensive intelligence system. Commander Charles J. Rend, Acting Chief of Naval Intelligence, stated that experience gained in the war had demonstrated conclusively that an efficient naval intelligence organisation is a prime essential of modern naval warfare. In a future war the difference between victory and defeat may depend on the training of intelligence officers. The course is to occupy from fourteen to eighteen months, according to the language studied. Each student is required to master thoroughly at least one foreign tongue, fourteen hours being allotted to study every day. New entries to the course are taken in every six months. In addition to languages, the subjects studied include geography, history, government, economics, politics, and customs.

An ambitious programme of research, for which \$39,000,000 have been

allotted, was described in March 1946 by Rear-Admiral Harold G. Bowen, Chief of the Office of Research and Inventions. Naturally, investigation into the use of atomic energy as a propulsive factor for warships, the development of nuclear munitions, and the education of naval personnel in nuclear energy and its applications come high on the list. Admiral Bowen foreshadowed the ultimate arrival of such formidable weapons as aircraft travelling at over 1,000 miles an hour and carrying atomic bombs. For investigation of this problem, some of the best-equipped German wind tunnels have been brought across the Atlantic and reinstalled. Nor is higher speed likely to be confined to the air. With atomic energy it should be possible to propel ships at speeds beyond anything dreamed of in the past. Moreover, a ship powered by atomic energy would have a cruising radius dictated only by the amount of provisions and stores that could be carried.

Other subjects to be investigated come under the headings of chemistry, medical science, nuclear physics, electronics, mathematics, geophysics, propulsion and missiles, mechanics and materials, physics, fluid mechanics, and sub-surface warfare. Much of the work will be basic research, and will be carried on by means of contractual agreements with research institutions. An example of this is the two-year \$200,000 contract with Princeton University, of which Dr. Henry D. Smyth (author of the Smyth Report on Atomic Energy) will be in charge. The work will include a considerable amount of research into cosmic rays, under the direction of Dr. John A. Wheeler, who made important theoretical contributions to the atomic bomb. Other members of the physics department of the University, as well as graduate students, will participate, and physicists associated with Johns Hopkins University will co-operate with the Princeton group. A new administrative building has been constructed by the Navy on the Princeton campus, next to the laboratories used by the Department of Aeronautical Engineering.

Amongst the new weapons being investigated, guided missiles have received particular attention. Early in May a demonstration was given at Chesapeake Bay of an experimental rocket engine known as the "Moby Dick," claimed to generate 66,000 lb. of thrust for two seconds, or one-third more driving force than that of the German V2 rocket used in the closing stage of the late war. This thrust is roughly equivalent to 80,000 h.p. at 400 m.p.h. The engine is of cylindrical form, nearly 9 feet in length and 17 inches in diameter, with a weight of over 13 cwt. Half of this weight is taken up by the solid propellant, the nature of which has not been disclosed. By means of this engine it is hoped to increase the speed of the naval rocket known as "Tiny Tim" (a 10-foot aircraft rocket weighing 11 cwt. and carrying a 500-lb. bomb) by more than three times its present velocity of 900 feet per second. In the meantime the most practical adaptation of the new engine is considered to be for jet-assisted take-off of large aircraft.

A much smaller rocket engine developed by the Navy is the CML 2 N, a cylindrical chamber only 10 inches long and 4 inches in diameter. In spite of its diminutive size, this gives a 350-lb. thrust for more than two minutes. The propellant is a liquid mixture of nitric acid and aniline (an oily liquid derived from coal tar). The acid, which supplies the oxygen, and the aniline fuel are fed into the combustion chamber under pressure, and burn at temperatures of several thousand degrees.

A month later the Navy Department released some particulars of a

"ram jet" which promises speeds for guided missiles ranging from 800 to 1,500 miles an hour, or more than twice the speed of sound. The first successful flight of the ram jet was made on June 13, 1945, at Island Beach, New Jersey. Development of practical working models of this supersonic engine was achieved through the combined work of the Bureau of Ordnance, the Applied Physics Laboratory of Johns Hopkins University, and twenty associated industrial organizations and universities. It is stated that the ram jet has been conclusively proved to be a practical method of achieving high-speed flight at high altitudes. It is described as being essentially an open pipe, into the forward opening of which oxygen is scooped during flight and compressed by the speed of the jet. Fuel is injected and consumed, returning through to the exhaust. The weight is under 70 lb., and there are no moving parts.

Test firings of V2 rockets have been taking place from time to time at the Army Ordnance proving grounds at White Sands, New Mexico, to assist research into problems of propulsion, etc. So far this has proceeded along the lines of rocket engines, ram jets, and a combination of both. Development and use of more powerful fuels has created fresh metallurgical problems. Materials must have greater strength to withstand the corrosive actions of these fuels and resist melting caused by generation of tremendous friction heat in flight. Another problem is that of trajectory. With long, flat trajectory, close to the earth's surface, the force of gravity affects flight. In such circumstances additional power must be provided without reducing the explosive charge in the warhead. High-angle trajectory, propelling the missile far above the atmosphere, may result in disintegration on return to the ground.

In experiments, to determine the nature of the upper air, special instruments have replaced the warhead. These instruments, weighing as much as 16 cwt., relay to the ground by radio impulses the temperature, pressure, cosmic rays, spectigraph studies, and other dynamic effects on the missile. By forcible ejection from the body of the missile, delicate recording instruments bearing invaluable data can be parachuted to the ground undamaged. Previously such information was limited to the ceiling altitude of the free balloon, 21 miles. Now the rocket-propelled missile has pierced the ionosphere, over 100 miles above the earth.

In a series of tests with an experimental gas turbine plant in the Naval Engineering Experiment Station at Annapolis, Maryland, successful operation has been accomplished at a gas temperature of 1,350° F. Designed and built for eventual operation with hot gas at a temperature of 1,500° F., this 8,500 h.p. unit is claimed to be the first large multi-stage gas turbine for continuous power generation ever operated successfully at such high temperature. Numerous mechanical, metallurgical, and fluid-flow problems, so prominent in gas turbine development, have already been overcome. Designed for high efficiency, the Annapolis unit embodies innovations in cooling methods permitting the multi-stage turbines to operate safely at high inlet temperature by avoiding the undue weakening effect of the high temperature on the materials used for the rotating parts. The plant is arranged with two turbines operating in parallel—one turbine supplying the power required to drive the compressor, the second turbine furnishing the power necessary to satisfy the requirements of the driven machine or dynamometer. The compressor unit operates at a speed commensurate with the lowest possible fuel consumption. Fresh air enters the compressor at 40,000 cubic feet per minute and is discharged at a

pressure of 45 lb. per square inch to the heat exchanger, where it picks up heat from the turbine exhaust gases. The heated air then passes through two separately oil-fired combustion chambers, where it is further heated to the desired turbine inlet temperatures. The gases then expand in two multi-stage turbines, one of which supplies the power to drive the compressor, the other furnishing external shaft power.

In June some information was released concerning a new type of jet-propelled torpedo with exceptional speed, accuracy, and striking power. A demonstration of this weapon was given at the California Institute of Technology. It weighs about 28 cwt., including a 10-cwt. warhead, and is designed to be launched from the air at speeds up to 350 miles an hour. On striking the water, a switch operated by the impact ignites the solid fuel; the projectile will then approach its target at 70 m.p.h. below the surface, the range being 1,000 yards. Its range is therefore inferior to that of other modern types of torpedo. For test purposes a 500-foot tank, 16 feet deep and 12 feet wide, was constructed.

In November the ex-German submarine U 977 was sunk almost instantaneously in tests of a standard type of torpedo incorporating a novel feature "never before used," off Cape Cod. Three weeks later it was disclosed that this feature was a "proximity fuse," able to explode the warhead charge before actual contact. Known as Mark IX, this fuse's operation is based on variations in the magnetic field produced by the steel hull of a ship. Highly sensitive electric mechanism responds to this distortion and so sets off the charge. This principle is similar to that used in magnetic mines. The amplifier in the torpedo which relays the signal from the sensitive detecting device is built to withstand the severe launching shock of acceleration, up to 1,000 g. Compactness and efficiency are greatly improved by use of minute radio valves as developed for the proximity fuse in artillery shells and small but powerful batteries as used to energise hearing aids.

Advantages claimed for the new fuse are that explosion is not dependent on contact with the target, the area of which is increased; torpedoes can be set for greater depths, where they will operate with more accuracy; and the damage done is greater, as explosions beneath the keel are more destructive, especially against heavily armoured ships. It was further revealed that the initial tests were carried out by aircraft in May 1945 against the hulk of the 13,000-ton tanker *Ampetco* off Curaçao, Netherlands West Indies. This ship sank ten minutes after the second hit.

ATOMIC BOMB EXPERIMENT.

Experiments with atomic bombs against moored ships at Bikini are described fully in another chapter; but it may be useful to recite here the names of the principal ships subjected to these tests. They were the battleships *Pennsylvania*, *Nevada*, *New York*, *Arkansas*, and *Nagato* (ex-Japanese); the aircraft carriers *Saratoga* and *Independence*; the cruisers *Pensacola*, *Salt Lake City*, *Prinz Eugen* (ex-German), and *Sakawa* (ex-Japanese); the destroyers *Mayrant*, *Trippe*, *Stack*, *Rhind*, *Bagley*, *Helm*, *Ralph Talbot*, *Mugford*, *Lamson*, *Flusser*, *Coyneham*, *Smith*, *Anderson*, *Mustin*, *Hughes*, and *Wainwright*; the submarines *Skipjack*, *Skate*, *Tuna*, *Bearaven*, *Parche*, *Pilotfish*, *Apogon*, and *Dentuda*; and 19 transports, all vessels of mercantile type and therefore less likely to resist the effects of explosion than ships designed for war purposes.

In the first experiment the cruiser *Sakawa*, two destroyers, and two

transports were sunk, while severe damage was inflicted on other ships. On the second occasion the ships sunk were the battleships Nagato and Arkansas; the aircraft carrier Saratoga; and the cruiser Prinz Eugen, which foundered some months later from after-effects of the damage received. Various other ships were damaged to a disabling extent.

A hint of the lines on which defence against atomic weapons is being developed was given the following month by Captain Steadman Teller, U.S.N., Chief of the section responsible for guided missiles. He stated that remote control missiles, launched either from ships or from aircraft, with long ranges and of high precision, were regarded as the best antidote. He intimated that there was every prospect of some of these weapons being brought into practical use in the near future, mentioning in particular radio-controlled and jet-propelled rockets of very high speed, carrying devices capable of detecting either an aircraft or a more important target; the new type of jet-propelled torpedo with Mark IX proximity fuse; submarines capable of launching heavy missiles at enemy shore establishments from long ranges; radar-guided glider bombs with "great precision, reliability and striking power"; guided missiles launched from either land, sea, or air, with speeds and ranges beyond anything hitherto achieved for anti-aircraft operations; and rockets capable of carrying 500-lb. loads up to a distance of 120 miles above the surface of the earth. While many technical problems remained to be solved, he was confident that "continuous application of the principle of group research should lead to the solutions as fast as they can be attained by possible enemy powers."

In spite of this foreshadowing of numerous new weapons, the gun is not yet obsolete in the United States Navy. Last year saw the installation in the heavy cruisers of the "Oregon City" type of an 8-inch triple turret described as "completely automatic from ammunition handling room to gun chambers," and able to load fused projectiles at all angles of elevation. Its fire-power is many times greater than that of any previous 8-inch gun. Two fresh models of 3-inch anti-aircraft guns have also been produced. One is a twin 50-calibre mounting with an automatic loader that gives a greatly increased rate of fire. It will be able to discharge a heavier and faster stream of fire against aircraft or missiles than the existing 40-millimetre weapon. There is also a 70-calibre high-velocity 3-inch which will fit into a completely automatic machine-gun mounting. Its accuracy, rate of fire, effective range, and damage effect will be many times greater than that of any automatic anti-aircraft gun in existence. To obtain longer life, higher velocity, and greater accuracy, it embodies new features not previously used in American ordnance.

Another novelty, with tank models of which the United States Navy has recently carried out experiments, is a submersible aircraft. It must be emphasised that this is in no sense a submarine able to fly, but an amphibious plane which can land on the water, submerge for long periods, and afterwards take off from the sea to resume flight. Such an aircraft, it is contended, should be able not only to elude pursuit by enemy planes, but also to baffle radar detection and avoid guided missiles. It would need to be jet-propelled, with the air vents closing automatically as the machine strikes the water. In order to withstand water pressure, the construction of its frame must be exceptionally strong. Another type of power would be required for operation under water.

By means of a voice-ray telephone developed by the U.S. Navy towards the close of the war, conversations can now be conducted between ships or

from ship to shore within a distance of eight miles. It is admitted by the Navy Department that the basis of this device is infra-red rays. It is valuable in eliminating the possibility of freak interception or of interference by an enemy many miles away, which is possible with ultra-high radio frequencies. Of course these invisible rays will not penetrate fog, water, or any medium that can stop a visible light ray.

Though considerably hindered in its peacetime development by manning difficulties, the U.S. Navy does not intend to be caught with inadequate reserves in the event of an emergency arising suddenly. Its goal is a peace Reserve totalling a million, mostly composed of 1941-45 veterans. Of these, 25,000 officers and 177,000 ratings will be organised for immediate call-up; these will include surface, submarine, and flying personnel, with other specialists of all branches. It should thus be possible to put the entire active and reserve fleets into action at ten days' notice. The remainder of the reserves would be employed in manning shore bases, etc.

Although the main strength of reserve officers would be drawn from those who served in the recent war, a continuous supply of new ones is expected to be forthcoming from the Naval Reserve Officers' Training Corps, from men enlisted in the Naval Reserve, and from various civilian sources. Reappointment in the Reserve will be on the basis of former rank. An important provision is that time served in inactive status will count as service for pay purposes in the event of recall to active duty.

Naval aviation will take a prominent part in the Reserve organisation, providing for 6,100 naval and marine aviators, 2,800 ground officers and 18,800 ratings. Organised Air Reserve flight personnel will be given 100 hours of flying time every year, while those belonging to the Volunteer Reserve will get 50 hours. Modern fighters, bombers, reconnaissance and torpedo aircraft will be used for this training. To ensure its physical fitness, the Organised Reserve will draw younger officers and men who are duly qualified from the Volunteer Reserve each year. Apart from flying, refresher courses will be given in gunnery, bombing, tactics, navigation, instrument flying, carrier landings, communications, and night operations.

To maintain 21 stations for the programme of training, a force of 13,000 officers and men will be recruited from the Naval Reserve for active duty as station keepers.

BATTLESHIPS.

In the United States Navy the battleship is now regarded as secondary to the aircraft carrier. Only two of the former category are at present being maintained in full commission. That the whole question of the future employment of battleships is under consideration may also be deduced from the fact that the construction of the 45,000-ton Kentucky, as well as that of the battle cruiser Hawaii, has been suspended for twelve months in order that both ships may be given a main armament of rockets. Pending the installation of these revised armaments and their testing after the ships are completed, no opinion can be expressed as to the future of the battleship in the U.S. Navy.

AIRCRAFT CARRIERS.

No outstanding development in aircraft carrier design has to be reported. The third ship of the 45,000-ton type, the Coral Sea, does not appear to differ in any perceptible degree from her two predecessors. Two

new light fleet carriers, the Saipan and Wright, of 14,700 tons, have passed into service. With an armament of four 5-inch dual-purpose guns, supplemented by numerous 40 mm. weapons, and a reputed speed of 33 knots, they appear simply to be slightly larger versions of the "Independence" class, seven ships of which remained on the list at the end of last year. There has been some reduction in the number of escort carriers. Not only the two oldest, the Charger and Long Island, but several of more recent design, such as the Attu, Casablanca, Kalinin Bay, Makin Island, Salamaua, Solomons, Wake Island, and Sangamon, have been placed on the disposal list during the past year, reducing the number of escort carriers available to less than 70. Of these, a high proportion appears to be laid up in the inactive reserve.

CRUISERS.

When compared with pre-war ratios, the proportion of cruisers to other categories would seem to be rather high, especially considering the number of carriers now in service. It may therefore be expected that, as new ships commission, some of the older ones, already laid up, will be finally discarded. As completed, the last three ships of the "Baltimore" class proved to be of a modified design, with a single funnel and reduced superstructure, and are apparently to be counted as a separate type, known as the "Oregon City" class. With a displacement of 13,700 tons, 100 tons more than that of the "Baltimores," they do not differ much from the latter in armament or other features. It has been stated that the engine design includes no cruising turbines. In the event of either port or starboard fuel tanks being ruptured, it is claimed that a changeover of suction to the other side could be accomplished in a minute, the oil-burner supply lines being divided at the boiler face.

In the four ships of the 17,000-ton "Des Moines" class, still under construction, the most remarkable novelty is that all guns from the nine 8-inch downwards are fully automatic. Cartridge cases have replaced wrapped charges and shells have an automatic fuse setting. Much of the enhanced tonnage of these ships is taken up by rapid-loading gear and extra magazine space, though something will be saved by economising in complement. Three of these ships had been launched at the time of writing, two in March 1947 and the Des Moines herself in September 1946.

Light cruiser development exhibits characteristics somewhat similar to the above. The Fargo and Huntington, which were to have been the last pair of the "Cleveland" class, are modified on lines corresponding to the "Oregon City" design, with only one funnel and simplified superstructure. There is understood to be no increase in the displacement of 10,000 tons. Further developments must be looked for in the two ships of the "Worcester" class, of which one was launched recently; they are of 14,700 tons, but the main armament will continue to be twelve 6-inch.

In the three recently completed ships of the 6,000-ton "San Diego" class, the Juneau, Spokane, and Fresno, modifications have been introduced with the objects of reducing weight and improving stability. "B" and "X" turrets are sited a deck lower than in earlier units of the class, and the eight torpedo tubes which were included in the original design have been omitted.

DESTROYERS, SUBMARINES, ETC.

All destroyers completed prior to 1940 have now been discarded. There have been reports that in some ships of the 2,400-ton "Gearing"

class the heavy weights carried on the forecastle have resulted in cracks developing in the hull in the way of the two forward turrets, each housing a pair of 5-inch guns. Another report speaks of "A" turret face being stove in by heavy seas and having to be reinforced. It is an experience common to most Allied navies that, during the war, the tendency to magnify offensive qualities by increasing armament and equipment inevitably led to overloading some ships; and these statements concerning the "Gearing" design should not detract from the fact that these ships have given an excellent account of themselves in action.

Destroyer-escorts, or escort destroyers, whichever one chooses to call them, have also been reduced in number by scrappings. Practically all those remaining in service mount 5-inch guns as their main armament.

Apart from the proposal, since approved, to build two 2,000-ton submarines of experimental design in 1947, it was decided some months ago that 60 existing units should be fitted with the German *schmorkel* device. The first submarine taken in hand for this equipment to be installed was the *Irex*, one of the 1,570-ton vessels of the "Corsair" class, under construction in the Naval Shipyard at Portsmouth, N.H. Extensive experiments are believed to have been carried out with surrendered U-boats before the above decision was reached.

The extensive series of scrappings, foreshadowed in this Annual a year ago, has since proceeded at a rapid pace. Minesweepers, patrol craft, and every kind of auxiliary have figured largely in the lists of vessels offered for sale. Only four yachts remained at the end of 1946, and an equal number of motor torpedo boats. While the former were admittedly a wartime addition to the list, of the nature of a stopgap, the disappearance of the latter category may cause some surprise. It is the considered opinion of the Navy Department that in the Pacific War the motor torpedo boat failed to justify its upkeep, and no more will therefore be built.

Only a single large minelayer—the *Terror*—remains in service, and a considerable reduction has been made in the number of minesweepers of various types. A multitude of cargo ships and transports reverted to mercantile status. Landing ships and landing craft have also been disposed of in large numbers, and only the six most modern hospital ships have been retained.

Return is still awaited of various naval vessels lent to the Soviet Navy, including 28 frigates and 10 fleet minesweepers, besides the old cruiser *Milwaukee* and numerous small craft.

Some ships have been adapted for other duties than those to which they were originally assigned. The *Jupiter*, previously a general stores issue ship, has been reclassified as an aviation supply vessel. The attack cargo ships *Pamina* and *Renate* have become the surveying vessels *Tanner* and *Maury*, respectively; and the *Montauk*, designed as a netlayer but completed as a landing ship (vehicle), has now reverted to netlaying service, with the new name *Galilea*. Two tugs have become the submarine rescue vessels *Bluebird* and *Skylark*.

NAVAL AIRCRAFT.

Last May the Bureau of Aeronautics announced that experiments had been carried out with swept-back wings in full-scale aircraft in the course of attempts to attain supersonic speeds. For the initial flight tests a modified P63 Bell Kingcobra, equipped with wings swept back 85 degrees

and carrying the designation L39, was employed. The new wings were designed and fitted in the limited space of ten weeks by the Bell Aircraft Corporation.

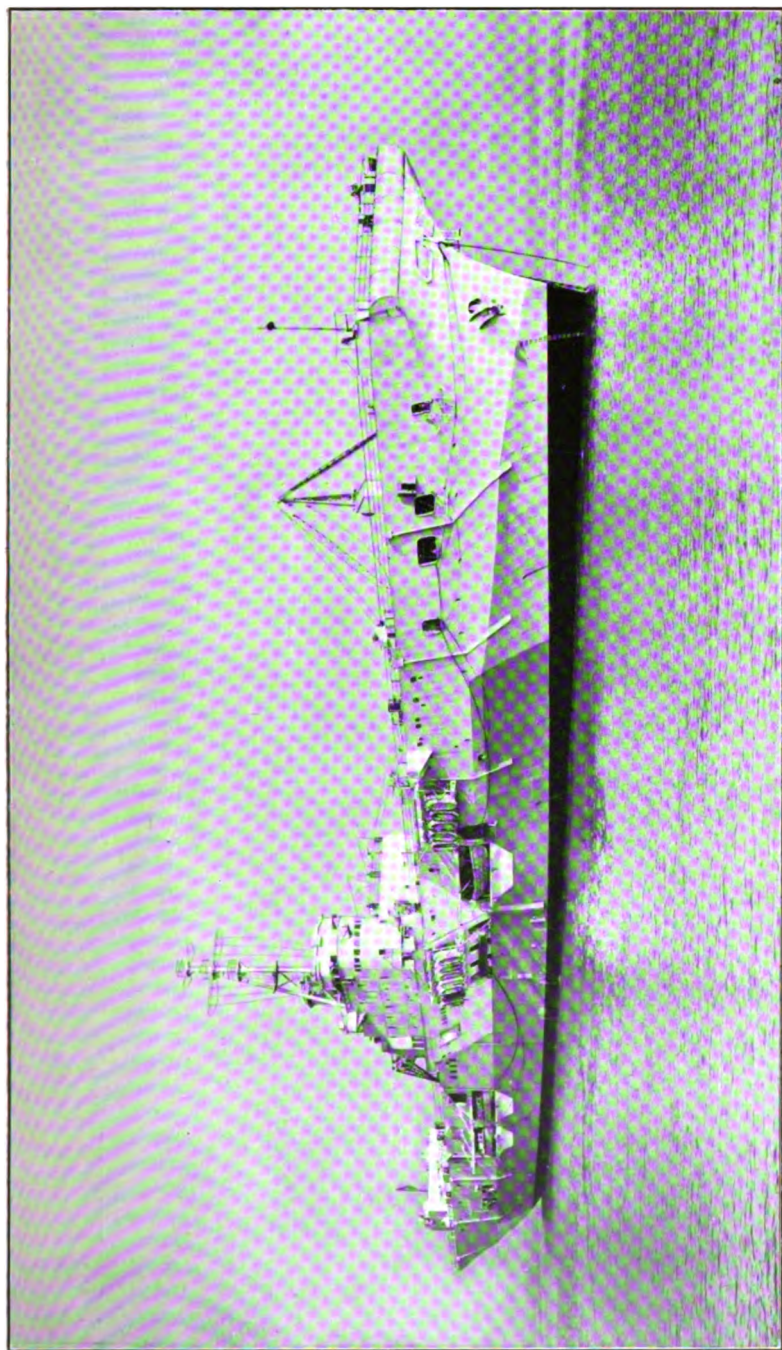
It is a known fact that when an aircraft approaches the speed of sound, its air resistance increases sharply. Sweeping the wings aft decreases air resistance and thus increases speed, but the effect of the wings upon the control characteristics of the plane have so far been unsatisfactory. All naval carrier-borne aircraft require to have slow landing speeds and excellent control characteristics to enable them to land on the restricted area of a carrier's flight deck. Tests with the L39 were not designed to increase speeds but to solve the problems of landing an aircraft with swept-back wings on board a carrier. This is believed to be the first American aircraft of otherwise conventional design that has ever flown with highly swept-back wings.

A month later it became known that a new experimental and research fighter, the XF5U1, was being tested by the Navy. It is modelled on an original "flying wing" design dating back to 1933. In appearance it is described as a cross between a bat and a pancake, but more elongated than the conventional "flying-wing" idea, with a horizontal stabiliser and vertical fins at the rear. It is officially stated to be "the only known type which offers both extremely high speed and extremely low speed in one engine." This is accomplished by means of two-speed reciprocating engines with a speed range of from 40 to 425 miles per hour. By the addition of water injection the speed range could be altered from 20 to 460 miles per hour, and by use of gas turbines from zero to 550 miles per hour, it is claimed.

Preliminary tests began in 1942 with a full-scale, low-powered model made of wood and fabric. The original design was thus proved to be practical. In the experimental model of stronger material since constructed, the pilot may fly in a prone position, encased by a transparent "blister." In the Naval Department announcement it is added: "The XF5U1 is powered by two R2,000-2 engines which, through a transmission system, turn the two propellers at approximately one-fifth the r.p.m. of the engines. A further refinement enables either engine, in case of the failure of the other, to drive both propellers."

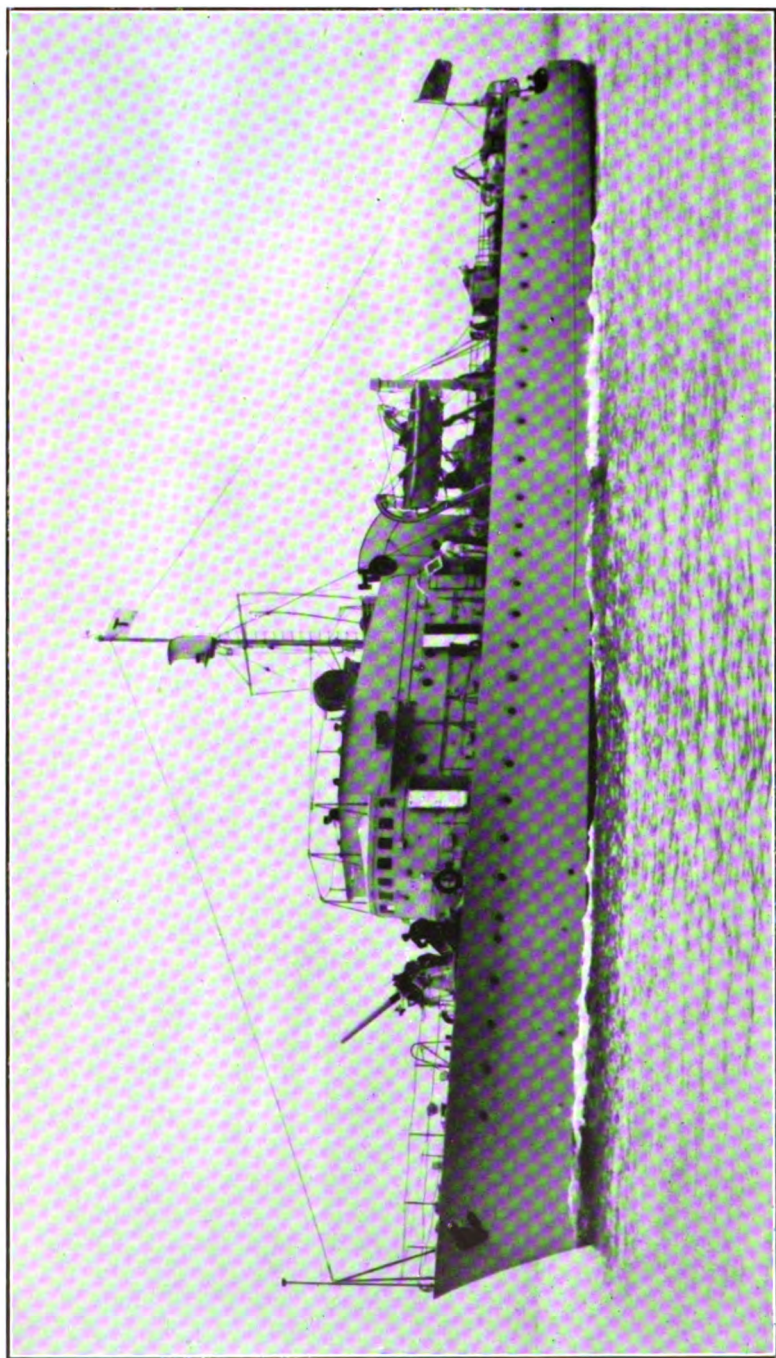
In June also it was announced that the Navy had accepted delivery of a new amphibious Mariner, designated PBM5A. This is a variation of the naval seaplane of the same name used in convoy duty and anti-submarine warfare during the war. As a companion to the amphibious Catalina, PBY5A, it is considered particularly suitable for air-sea rescue work. With a gross weight of 27 tons, the new Mariner has a capacity of approximately 20 tons of useful load, including fuel. In view of its adaptability to air-sea rescue work, the Coast Guard is also interested in this new amphibian.

In August the Navy disclosed particulars of the world's largest service transport aircraft, the 92-ton, 168-passenger Constitution, with a maximum range of 6,000 miles. It was predicted that within a year flights would be made from the west coast of the U.S.A. to Japan and China with only one intermediate stop, at Hawaii. This new transport can carry more than three times as many passengers as the Army's four-engine Douglas C54 Skymaster, and do so more efficiently and economically, according to Vice-Admiral A. W. Radford. Had the war continued, 50 of these big planes would have been ordered, but there is no immediate intention to



H.M. Aircraft Repair Ship Pioneer.

(Courtesy of Messrs. Vickers-Armstrong.)



Turkish Minelayer Sivrihisar.
(*Courtesy of Messrs. Thornycroft.*)

utilise more than the two that have so far been completed. These cost the Navy a total of \$27,000,000, including development expenses ; but subsequent models are expected to cost \$2,225,000 each. Officially designated the XR60, the Constitution has a wing-span of 189 feet and a length of 156 feet. Its four Pratt & Whitney Wasp Major engines provide 12,000 h.p. Top speed is more than 300 miles per hour. The aircraft can take off from the small airstrips which dot the Pacific, requiring a run of only 2,350 feet. It has a stalling speed of 80 m.p.h. and a useful load capacity of 85 tons. It is the first naval plane to have four-wheel landing gear, i.e. four wheels on each of the main gears. It lands without shock with the aid of prerotation devices which turn the wheels at landing speed just before impact. Repairs may be made on one engine while flight is maintained on the remaining three. The Constitution's massive wings permit inspection during flight through man-size tunnels. These wings are also designed to utilise gas-turbine power when it becomes available. The interior of the passenger cabins is pressurised, permitting maintenance of normal air condition at from 10,000 to 25,000 feet. There are two decks, 59 windows, seven doors, and 13 emergency exits. There is an entrance in the nose. Every known flying aid, including the most complete navigational radar equipment ever installed in an aeroplane, is provided.

During July six successful flights were made from the carrier Franklin D. Roosevelt by a Phantom XFD1 jet-propelled aircraft piloted by Lieut.-Commander James J. Davidson, U.S.N. The plane had undergone tests for the previous six weeks at the Naval Air Test Centre at Patuxent River, Md., but these were its first flights from and landings on the deck of a carrier, and so provided valuable operational data. Two difficulties which had to be overcome in adapting jet planes for this purpose were to be able to take off in the short length of part of a flight deck and, much more important, to develop power of acceleration in the engines so that an aircraft can be given a "wave off" if the deck does not happen to be clear for a landing. To test the latter quality, Lieut.-Commander Davidson was unexpectedly given a wave off, and accelerated without incident.

This is the first U.S. naval fighter plane powered exclusively by jet engines for carrier operation. With full combat load its weight is under 4½ tons, though for test purposes this was reduced to just under four tons. Armament consists of the standard type for fighter planes, in the nose. It is the first U.S. naval aircraft to exceed 500 m.p.h., which, coupled with the fact that it has an exceptionally high rate of climb and a service ceiling of more than seven miles, makes the Phantom an ideal interceptor. Although it has a wing span of 40 feet, the wings when folded and rigged for stowage make the plane only 16 feet side. This is much narrower than other aircraft and so permits greater numbers of Phantoms to be operated from a limited space in a carrier. A group of 30 of these new aircraft was due for delivery last autumn, when an all-jet squadron was assigned to a carrier to carry out further operational and tactical tests.

In October it was announced that a high-speed, long-range patrol bomber, powered by two conventional and two turbo-jet engines has been developed by the Navy. The experimental model, designated XP4M1 and built by Martin Aircraft Co. and the Navy Bureau of Aeronautics, was to have a speed "that in the past has been reserved for fighter and attack aircraft," it was stated. The two types of engines are mounted in one nacelle on each wing, giving the aircraft the appearance of a standard twin-engine type.

In November it was announced that the Phantom jet-propelled fighter mentioned above would shortly be joined by two other fighters of jet type, the XFJ1 and XF6U1, both able to fly at well over 500 m.p.h. These are designed for either carrier or land operation, and it is claimed "will put shipboard fighters on a par in performance with the newest land-based fighters." The XFJ1 is powered by a General Electric jet engine, the XF6U1 by a Westinghouse unit. The former has the appearance of a "stubby-winged flying bomb," it is stated; while the latter is made of a new material called metalite—two thin sheets of aluminium bonded to a balsa-wood core. Dimensions of these two aircraft are: XFJ1, 14 ft. 6 in. high; wing-span, 38 ft. 1 in.; length, 33 ft. 7 in. XF6U1, 11 ft. 9 in. high; wing-span, 30 ft. 2 in.; length, 32 ft. 10 in.

COAST GUARD.

During 1946 the Coast Guard reverted to Treasury control. Its Commandant is now Admiral Joseph F. Farley.

Two of the large icebreaking cutters of the "Wind" class, which were reported to have been lent to the Soviet Navy, have presumably been returned, as they have since been operating under the Coast Guard again. The cutter Northland, specially designed for the Bering Sea Patrol and launched twenty years ago, has been sold. She was a ship of over 2,000 tons displacement, with diesel-electric propulsion giving a speed of 11 knots.

CASUALTIES.

From December 7, 1941, to December 31, 1946, inclusive, the total casualties of the U.S. Navy, Marine Corps and Coast Guard amounted to 88,842 dead. All men missing in action have been accounted for and are included in these figures.

FRANCE.

M. Louis Jacquinot last year became Minister of Marine for the second time, though in view of the traditional instability of French Governments, there can be no certainty that he will hold that office for long.

The battleship Lorraine has ceased to be seagoing, though she continues to discharge the duties of a gunnery training ship. The aircraft carrier Colossus, on loan from the Royal Navy for five years, has been renamed Arromanches. France has the option of purchasing the ship at the end of three or five years.

Progress with the new cruiser De Grasse, in common with other projects, has been delayed owing to lack of sufficient funds allotted for naval purposes. Dimensions of this ship have now been released, the length being 592 feet, beam 60 ft. 4½ in., and draught 18 ft. 2 in.

Wholesale scrapping of unserviceable craft has reduced French submarine strength to 15, including the four of the Créole type under construction. The others include one lent from the Royal Navy, the Doris, ex-H.M.S. Vineyard; the Narval, formerly the Italian Bronzo; the surrendered German U2518, of 1,600 tons, lent to the French Navy for experimental purposes; the minelayer Rubis; four survivors of the "Archi-mède" class and three of the "Diane" class. Another U-boat, U2326, of the 233-ton type, was lost off Toulon some months ago.

The Pollux, built for the Imperial Russian Navy as an icebreaker in

1915 and subsequently taken over by France and converted into a mine-layer, has been brought back into service as a submarine depot ship. The vessel which formerly served in this capacity, the *Jules Verne*, is now classed as a repair ship. Seven ex-German craft of the trawler type have been fitted out for surveying duties, and another of larger size has become the seaplane tender *Commandant Giraud*. An ex-Japanese oil tanker, the *Hoei Maru*, has been taken over and renamed *Durance*.

RUSSIA.

Little fresh information is available concerning the Soviet Navy. The ex-German cruiser *Nürnberg* has been renamed *Makarov*, after the admiral who lost his life off Port Arthur in 1904. Various ships on loan from the British and United States Navies are due to be returned upon allocation of the surrendered ships of the Italian fleet. Other ships taken over by the Russians are understood to include the Roumanian destroyers *Regele Ferdinand* and *Regina Maria*, and the Finnish coast-defence ironclad *Vainamoinen*, together with five submarines and some motor torpedo boats formerly owned by the Finns.

Some additional minesweepers and patrol craft have made their appearance in lists of ships mentioned in Russian publications, but details concerning them are scanty. Over 40 fleet minesweepers, some 80 motor torpedo boats, and 50 motor launches fitted for minesweeping are amongst the most useful of the German ships acquired. Various fleet auxiliaries, tugs, etc., have also been obtained from this source.

ITALY.

After the cession of approximately 50 per cent. of her remaining tonnage for division between the British, United States, French, and Soviet Navies, Italy is left with the battleships *Doria* and *Duilio*, laid down 35 years ago but reconstructed before the war*; the cruisers *Garibaldi*, *Duca degli Abruzzi*, *Montecucoli*, and *Cadorna*; four destroyers and 16 large torpedo boats; 20 modern corvettes; 27 coastal minesweepers; eight motor launches; and a couple of dozen auxiliaries. In addition, 16 trawlers and 17 motor minesweepers are on loan from the Royal Navy pending clearance of minefields in and around Italian waters.

Under the Peace Treaty Italy is precluded from acquiring battleships, aircraft carriers, submarines, motor torpedo boats, or specialised types of assault craft. No new ships are to be added to the fleet until 1950, except as replacements of units lost by accident. Personnel must not exceed 22,500 officers and men.†

OTHER EUROPEAN COUNTRIES.

DENMARK.

It is hoped to complete the destroyers *Hvitfeldt* and *Willemoes* and the six torpedo boats *Bille*, *Buhl*, *Hammer*, *Holm*, *Krabbe*, and *Krieger* in the course of the present year. Three British submarines have been chartered from the Admiralty for training purposes, while two "River" class frigates and a "Flower" class corvette have been bought outright. Ten British motor minesweepers are on loan to the Royal Danish Navy, which is also manning 22 ex-German craft belonging to the same category.

* See "Brasscy," 1935, p. 81.

† See p. 314.

FINLAND.

Under the terms of peace with Russia, Finland has apparently had to cede a number of ships to the Soviet Navy, leaving her with hardly any craft of appreciable fighting value.

GREECE.

Though the reported transfer of H.M.S. Ilex and Cuckmere to the Royal Hellenic Navy proved to be unfounded, two more submarines, the Argonaftis, ex-H.M.S. Virulent, and Triaina, ex-Volatile, have been lent, together with a number of motor minesweepers and the repair ship Hermes, ex-Product. A salvage vessel, the Kingarth, is on charter from the Admiralty.

NETHERLANDS.

Owing to the scarcity of shipbuilding materials, it has been decided that no new warships shall be built in Dutch yards during 1947. Next year it is hoped to acquire a light fleet aircraft carrier from the Royal Navy in exchange for the escort carrier Karel Doorman (formerly H.M.S. Nairana), which will then be returned. The cruiser Tromp is undergoing a complete refit, and it is proposed to acquire two more destroyers at an early date, bringing the flotilla up to a total strength of eight. A depot ship, the Vulkan, ex-Beachy Head, has been obtained on loan from the Royal Navy.

NORWAY.

Four destroyers of the "C" class have been purchased from the Admiralty: the Bergen (ex-Cromwell, ex-Cretan), Oslo (ex-Crown), Stavanger (ex-Crystal), and Trondheim (ex-Croziers). No decision has apparently been reached on the question of acquiring a cruiser. Three submarines of the British "V" class have also been bought, and named Uthaug, Utstein, and Utvaer. Only two of the five fleet minesweepers of the "Bangor" type have been retained, but a number of motor minesweepers and coastal craft have been acquired instead.

Mystery surrounds the fate of the minelayer Olav Tryggvason. Last heard of in German hands somewhere in the Baltic, it is suggested that she may have been lost in an air raid in 1945, but no trace of her wreck seems to have been found.

POLAND.

Nine motor minesweepers of 130 tons, two motor torpedo boats, and a dozen 40-ton motor launches have been transferred from the Soviet Navy; and it is promised that a number of ex-German vessels shall follow in the course of 1947.

SPAIN.

As rebuilt, the cruiser Galicia has more extensive bridgework and after superstructure than the sister ship Almirante Cervera. She is now armed with eight 6-inch, eight 3.5-inch, eight 37-mm., and 20 20-mm. guns. The number of torpedo tubes has been reduced from 12 to six. Standard displacement is 8,250 tons.

Reconstruction of the Mendez Nuñez, of 4,680 tons, has also been

finished. She now mounts eight 6-inch, ten 37-mm., and eight 20-mm. guns, with six torpedo tubes, and has altered in appearance considerably.

Approval has been given for the construction of a new sail training ship, which it is proposed to name Don Juan de Austria.

SWEDEN.

The cruiser *Tre Kronor*, of 7,400 tons, was commissioned towards the end of last year, and is reported to have given complete satisfaction on trials. The sister ship *Göta Lejon* is nearing completion, as is the new destroyer *Öland*, of 1,800 tons. Four old torpedo boats, the *Hugin*, *Ragnar*, *Sigurd*, and *Vidar*, have been removed from the effective list.

TURKEY.

Fleet minesweepers purchased from the British Government some time ago number five. All are Australian-built, and have been renamed *Alanya*, ex-Broome; *Amasra*, ex-Pirie; *Antalya*, ex-Geraldton; *Ayancik*, ex-Launceston; and *Ayvalik*, ex-Gawler. Eight more ex-British minesweepers, due for return to the U.S. Navy under the Lend-Lease scheme, have since been bought by Turkey and named *Çardarli*, ex-Frolic; *Çardak*, ex-Tourmaline; *Çarsamba*, ex-Tattoo; *Çesme*, ex-Elfreda; *Edincik*, ex-Grecian; *Edremit*, ex-Chance; *Erdeveli*, ex-Catherine; and *Eregli*, ex-Pique. Sixteen motor launches and four motor minesweepers have also been acquired from the Royal Navy.

SOUTH AMERICA.

ARGENTINA.

Under the new Minister of Marine, Captain Fidel L. Anadon, a fresh programme of naval construction was approved in November 1946. It is to include the acquisition of an aircraft carrier, a cruiser, four destroyers, three submarines, ten patrol vessels, and a supply ship. Two new oilers have been added to the fleet, their names being *Punta Cigüeña* and *Punta Rasa*.

BRAZIL.

Admiral Sylvio de Noronha is now Minister of Marine, with Vice-Admiral Adalberto Lara de Almeida as Chief of the Naval Staff.

The submarine depot ship *Ceara*, a vessel of special design built in Italy 32 years ago, has been discarded.

All three destroyers of the "Marcilio Dias" class are now in service.

CHILE.

Ships added to the fleet during the past year include the frigates *Covadonga*, *Esmeralda*, and *Iquique*, and the corvettes *Casma*, *Chipana*, and *Papudo*, all purchased from Canada, together with two transports, two oilers, and a number of landing ships from the United States Navy.

COLOMBIA.

Two coastguard patrol vessels, the *Ayacucho* and *Boyaca*, an oil tanker and two river gunboats have been acquired. The old gunboats *Bogota* and *Cordoba* have both been lost.

DOMINICAN REPUBLIC.

Two new ships have been bought from the Royal Canadian Navy, the frigate *Presidente Trujillo*, ex-*Carlplace*, and the corvette *Colon*, ex-*Lachute*. It is reported that two more corvettes were being added, but these may have been intended for mercantile use.

MEXICO.

Arrangements have been made for the purchase from the United States Navy of two cruisers, eight destroyers, two motor torpedo boats, and two transports.

PERU.

Two frigates, formerly H.M.C.S. *Poundmaker* and *St. Pierre*, have been bought and renamed *Teniente Ferré* and *Teniente Palacios*, respectively. One of them replaces the old destroyer *Almirante Guise*, no longer effective. An oiler, the *Callao*, and a supply ship, the *Mariscal Castilla* (ex-H.M.C.S. *Preserver*), have also been acquired.

VENEZUELA.

Six corvettes out of seven originally obtained from Canada have now been incorporated in the Venezuelan Navy, their names being *Constitucion*, ex-*Algoma*; *Independencia*, ex-*Dunvegan*; *Federacion*, *Libertad*, *Patria*, and *Victoria*, which were formerly, though not respectively, the *Battleford*, *Amherst*, *Oakville*, and *Wetaskiwin*.

ASIA AND AFRICA.

CHINA.

Though the corvette *Fu Po* has been lost, other recent acquisitions include two escort destroyers, four fleet minesweepers, two patrol vessels, and 19 landing craft from the U.S. Navy. H.M.S. *Aurora* is to be sold to China in 1947, and President Truman recently signed an executive order providing for the transfer of over 200 more American vessels of various types in due course. The ex-Japanese gunboats *Ataka* and *Uji* have also been added to the Chinese Navy.

PERSIA.

Three of the four gunboats taken as prizes by the Royal Indian Navy have now apparently been returned to the Persian Government, but the fourth is understood to have been too worn-out to be worth retroceding.

EGYPT.

H.M.S. *Fowey*, a sloop of 1,100 tons, has been acquired for duty as a transport, to replace the *Sollum*, lost during the war.

FRANCIS MCMURTRIE.

CHAPTER IV.

THE MARITIME INDUSTRIES AT THE CROSSROADS.

THE future of British shipping depends, in great measure, on three factors—first, the rate at which tonnage lost in the Second World War, worn out by overstrain, or depreciated by old age can be replaced and the price that will have to be paid for it ; secondly, on the action of the representatives of the merchant officers and men in pressing for wage and other concessions, which might result, owing to the keen competition on the world's trade routes, in many vessels being laid up, with consequent unemployment afloat as well as ashore ; thirdly, on the degree to which foreign governments, especially such new maritime Powers as China, India and Soviet Russia, subsidise or otherwise protect their own shipping and shipbuilding industries.

History has been described by a cynic as the record of the errors of mankind. The history of the years following the First World War supplies ample warnings. Will those errors be repeated or new errors committed in the experience of the coming generation under the shipping conditions which are developing ?

A short-lived boom in shipbuilding and ship operation after the first of the world wars was followed, with an occasional lifting of the clouds, by the worst and longest depression which has ever been experienced by the maritime industries of this country. A few years before the outbreak of the Second World War work in the shipyards of Britain and Northern Ireland had come almost to a standstill—only 133,000 tons being in hand in 1933, with consequent widespread unemployment—and such passengers and cargoes as were available for transport were being carried, in many cases, at a loss. Whereas at the end of the nineteenth century this country was constructing 80·1 per cent. of all the tonnage afloat under all flags, or four out of every five ships, foreign competitors, with the aid, in many instances, of preferential railway rates, bounties, or subsidies, created in later years competing shipyards which were able to quote uneconomic prices for new ships as well as for repairs, with the result that in the four years ending in 1938 the British proportion of world construction had dropped to 36·2 per cent. On the other hand, British shipowners, suffering from much the same unfair competition on the trade routes, were compelled to restrict their operations in order to avoid bankruptcy and also to limit their orders for new tonnage. Whereas 52 per cent. of world tonnage was under the British flag at the beginning of this century, the figure had fallen to 26·2 per cent. in 1939, or about half what it had been at the peak of British maritime supremacy on the trade routes. The decline was not due to a falling-off in the efficiency of ship management, but to nationalistic practices abroad.*

It was not until the summer of 1939 that the Government of the day, after the facts of the situation had been brought repeatedly to the

* In spite of the decline in the percentage of British tonnage, in the years 1931–34 British ships which were laid up in idleness were at one time (July 1932) of 2,168,632 tons net and were never less than 1,028,366 tons net, except at the end of 1934, when the figure fell to 811,258 tons net.

attention of Ministers, realised that all the maritime industries were in grave danger, and decided to intervene. In due course a Bill was introduced into the House of Commons in July which proposed the following measures of assistance :

1. *Tramp Shipping Subsidy* : A sum not exceeding £2,750,000 annually was to be payable for tramp voyages on the recommendation of a committee—the Tramp Shipping Committee. The scheme was to come into operation on January 1, 1940, and remain in operation for five years, the amount paid each year being determined by reference to the index representing the average level of freight rates for that year.

2. *Shipbuilding Loans* : A sum of £10,000,000 was to be provided, out of which loans would be advanced for the building of cargo vessels, ordered after March 28, 1939, and laid down within two years from the commencement of the Act. Each loan was to be secured by a first mortgage and be repayable within twelve years from the date of the first advance.

3. *Shipbuilding Grants* : £2,500,000 was to be provided for grants toward the cost of building cargo vessels ordered after March 28, 1939. Five separate grants were to be made, the initial grant, payable on completion of the vessel but not earlier than March 31, 1940, not exceeding £500,000. If the average level of freight rates in any one year was higher than a determined index figure, the grant would be withheld in respect of that year, unless the average for the four years was less than this figure.

4. *Assistance for Liner Shipping* : A maximum sum of £10,000,000 was to be provided for assistance to liner services suffering from foreign subsidised competition. An Advisory Committee was to investigate applications for assistance and advise the Board of Trade on them.

5. *Merchant Ship Reserves* : The Board of Trade was to be empowered to purchase vessels registered in the United Kingdom for the purpose of creating a reserve for use in an emergency, to the amount of £2,000,000.

This Bill was supported by speakers from all sides of the House of Commons in view of the prevailing deplorable conditions, which had alarmed the whole country, more dependent on its shipping services than any other owing to the fact that it is surrounded by the sea. The Government, which admitted at long last that the British maritime industries had been the victims of nationalistic practices by aspiring competitors overseas, had delayed action too long. The Bill was abandoned owing to the outbreak of the Second World War. The shipbuilding and shipping industries, on which in the last analysis victory depended, entered therefore on the six years' struggle seriously crippled.

It is now a matter of history that shortage of ships and of shipbuilding facilities nearly brought the United Nations to defeat owing to the heavy losses by enemy action suffered in the early months of the war. In the tragic emergency a mission consisting of experienced British shipbuilders was sent across the Atlantic to seek the assistance of the Americans and Canadians. They took with them designs of ships in more immediate demand which could be built rapidly. In these circumstances the shipbuilding drive in the United States and, of course, on a smaller scale, in the Dominion gathered headway. The earliest of these ships passed out to sea just in time to save the situation. In the meantime, British shipbuilders were working to the limit of their capacity, but mainly on new men-of-war, for which there was urgent need. It was one of the miracles of the struggle, marked by so many miracles, that British shipbuilders and shipowners, in spite of all their pre-war troubles, were able to make so considerable a contribution to victory. That they could do so was traceable to the resiliency of free enterprise, the courage and resource of the shipyard employees, working under all the difficulties and dangers due to the blackout and the air raids, and the refusal of the seafarers, officers and men, to yield to the enemy's well-planned efforts to interrupt the sea communications on which, in fact, the issue of the war depended.

Will the lessons of history—the neglect of the 'tween-war years and

the strain, almost to breaking-point, of the six years of the Battle of the Seas—be ignored?

By the beginning of 1947 Lloyd's Register of Shipping reported, first, that ships of 1,987,062 tons gross were under construction in the shipyards of Britain and Northern Ireland, the highest figure which had been reached since March 1922, which marked the peak of the former post-war boom, when the total was 2,235,998 tons gross; and, secondly, that the work in hand represented 52·7 per cent. of the shipbuilding in the whole world. It was added that nearly a quarter of the tonnage was for "registration abroad or for sale," contracts having been placed by the governments or private shipowners of Argentina, Brazil, Chile, Denmark, Ecuador, Egypt, France, Holland, Iceland, Norway, Portugal, Sweden, Switzerland, and the Dominions. The large number of ships building for "registration abroad or for sale" was due, in some degree, of course, to the damage suffered by overseas shipyards during the war and to the anxiety of foreign and Dominion shipowners to replace losses at sea as soon as possible.

But that is not the whole picture. The *Shipping World* revealed at the same time that if account were taken of contracts which had been signed as well as ships under construction, the figures were 363 ocean-going ships of 2,616,155 tons and 625 short-sea traders and coasters of 305,410 tons, giving a total of 2,921,565 tons, of which rather more than a quarter was for overseas owners. It was calculated that many of the shipyards of this country would be busy for at least two years. Shipbuilders, it was evident, were doing well—but in a "seller's market" owing to the world-wide demand for ships of post-war design, greatly superior to the war-built tonnage, which was mainly of pre-war design, whether the vessels had been constructed in British, American, Canadian or other shipyards. So much for the shipbuilding activity in Great Britain and Northern Ireland—what were described as "boom conditions" existed.

So far as the shipping industry was concerned, the immediate outlook on the trade routes in the early months of 1947 was also good, though some controlled freights had been reduced by the Ministry of Transport.* Ship-owners were making ends more than meet after six years in the straight waistcoat of war-time control, when their profits were limited to a nominal 5 per cent. which, when everything was taken into account, often worked out at a considerably lower figure.

Thus the scene was set for the resumption of the movement of the ocean commerce of the world as soon as conditions became normal. It was at once apparent that keen as had been the competition in the 'tween-war years, it would become even keener as soon as the various maritime nations, old and new, were able to complete their various shipbuilding programmes. What the result of this new struggle for commercial seapower may be it would be rash to prophesy. If the British shipping industry is unable to meet and beat its rivals, the balance of the national trading account will be upset, for a decline in the number of British ships paying their way on the trade routes would limit orders to the shipyards of this country and a reduction in output would necessarily lead to higher costs, with the result that shipbuilders might no longer be able to secure the flow of orders from overseas customers which is essential if full employment is to be assured. Of all groups of industries, none has in the past made so

* The Minister of Transport stated in the House of Commons, on March 3, 1947, that "in general the freights charged by British ships are appreciably lower than those of ships under other flags."

large a contribution to this country's exports, visible and invisible, as those connected with shipping, shipbuilding and the ancillary industries which are concerned with ship equipment. No complete figures are available of the export of ships and ship equipment, but such official figures as are available show that the exports were not inconsiderable.

TABLE I.

<i>Year.</i>	<i>Merchant Ships.</i> £	<i>Men-of-war.</i> £	<i>Year.</i>	<i>Merchant Ships.</i> £	<i>Men-of-war.</i> £
1926	4,610,679	19,300	1933	1,891,919	679,928
1927	4,485,267	45,388	1934	1,164,909	597,586
1928	10,755,424	5,143,130	1935	2,203,558	874,226
1929	11,690,916	3,820,250	1936	3,479,243	119,039
1930	19,435,016	707,400	1937	2,932,705	1,140,588
1931	9,857,745	600,000	1938	6,468,657	2,490,937
1932	3,388,575	525,000	1939	—	—

What of the future? The most reliable estimate is that the post-war merchant fleets of the maritime nations will be about 80,000,000 tons gross, an increase of 25 per cent. on the figure in 1939, when the shipping industry under all flags was depressed owing to the want of cargoes as well as passengers. Of the tonnage now afloat, approximately 38,500,000 tons gross is the result of the shipbuilding drive in the United States, as compared with 6,500,000 tons gross built in the shipyards of Britain and Northern Ireland, which concentrated mainly on the construction of men-of-war. It would be rash to assume that 80,000,000 tons marks the peak in the expansion movement. At any rate, it is certain that competition on the trade routes will be keen. While Germany and Japan have, for the time being at least, been banished from the oceans, new rivals are appearing. China, India (now an independent Sovereign State), Russia (hitherto of small importance as a sea power), Argentina as well as other South American republics, Canada, South Africa, and Australia have ambitions to play a big part in the movement of cargoes as well as of passengers, while the United States emerged from the Second World War with a great programme of shipping expansion, the aim being that half the cargoes entering and leaving the ports of that country shall be carried in ships flying the Stars and Stripes and manned by American seamen. This is the target set up in the Merchant Shipping Act passed by Congress in 1936 and it is still the target of the administration to-day.

Argentina is following the American lead. The Argentine, having acquired a few ships during the war and operated them successfully when there was little or no competition, has adopted an ambitious policy. Señor Miranda, the President of the Central Bank, who is in close touch with the Peron administration, has declared that :

" the Trade Promotion Institute is establishing branches in all countries, in order to intensify our trade with them and seek new markets. With the same object, it has contracted for the construction of refrigerator ships and is studying plans for further shipping purchases. In addition, the official Banks are providing financial assistance for the purchase of ships by Argentine concerns, on the express condition that during the space of twenty years they may not change their flag or route. This will explain why in our international agreements we insert a clause to the effect that 50 per cent. of the sea transport must be effected by Argentine tonnage; and that, in the case that the other party lacks sufficient shipping of its own flag to carry the remaining 50 per cent., preference must be given to Argentine vessels. It will not be long before this system will allow of the whole of our production being carried under the blue and white flag that the great Bouchard showed at all the ports of the world. We intend to do with the ships the same thing as with the industrial plants: we will charter them, or exploit them through the State Merchant Fleet, or we will

form companies with Argentine capital. We will adopt the system best suited to each case : the main thing is to carry our production in our own ships and create a great Argentine Merchant Fleet which will enable us to retrieve the heavy sums now represented by freight charges, enlarging the great family of seamen which we must have in view of our extensive seaboard."

Variations of the same nationalistic policy are being discussed in India and China, which, like Argentina, have been well served in the past by ships under the British and other flags ; while Russia, if she can gain " warm water " ports, has also a programme of shipping development. Canada and Australia extended their shipbuilding facilities during the war and thus created vested interests which demand that the respective Governments shall nurse the infant shipbuilding as well as shipping industries.

British shipowners of the Victorian era admitted that British shipping, in its halcyon days, prospered in times of war, pestilence and famine, with the result that out of the profits new ships were built, so that any of those disasters brought orders to the shipyards ; as soon as these had been worked off shipowners and shipbuilders alike suffered from the depression of peace. During Queen Victoria's reign, the two China Wars, the Crimean War, the Indian Mutiny, the Abyssinian Campaign, the Ashanti War, the Zulu War, the first Boer War, the Egyptian Campaign, and the War in South Africa of 1899-1901 led to the employment of a considerable volume of British shipping, which was also favourably affected by the wars in which other nations engaged, since any warlike operations, in great or less degree, react on the supply of tonnage offering in the freight market or available for the conduct of liner services. As the supply of tonnage which was free for commercial purposes became restricted, the earnings of shipowners increased. They and those who had invested money in the industry shared some of the profit, and the remainder, passing into reserves, became available for the building of new ships.

In these circumstances the shipping industry prospered in the past. Even in the early months of the First World War no control was imposed and high profits were made. It was only after the struggle had been in progress for some time that the Lloyd George Government decided to restrict profits by exercising control. But in the war that began on September 3, 1939, the Government intervened immediately, with the result that, in the phrase of the time " the profit was taken out of war." Consequently, shipowners had no opportunity of building up reserves with which, on the coming of peace, they could pay for new ships to replace those which had been lost or worn out. But, nevertheless, they had " the fat " of former years of conservative finance on which they could carry out their replacement programmes. The idea that they could replace ship for ship was regarded from the first as hopeless of realisation and, fortunately, owing to technical progress, this was not essential, since more efficient engines and boilers enabled higher speeds to be attained without an increase of weight. In these circumstances orders were placed, especially by the liner and oil tanker companies, immediately hostilities ceased, while tramp owners were eager buyers of war-built tonnage, British, American and Canadian, at, of course, far higher prices than in pre-war years.*

What contribution in these new conditions can shipping make to the

* By the end of 1946 British shipowners had paid to the Government £41,431,648 for war-built ships and had taken on charter other ships, agreeing to pay for their use a sum of £2,761,280 per annum.

national trading account? Particulars have been given (Table I) of the contribution which the shipbuilding industry made by its exports. But the aid given by shipping in the form of freights earned in the foreign trade of the world was far greater. According to the figures prepared by the Board of Trade :

TABLE II.

Gross Earnings of British Shipping Engaged in the Foreign Trade of the World, after deducting Expenditure in Foreign Ports, amounted as follows in the years quoted :

Year.	£	Year.	£
1920	340,000,000	1929	130,000,000
1921 (No figures available.)		1930	105,000,000
1922	110,000,000	1931	73,000,000
1923	133,000,000	1932	65,000,000
1924	140,000,000	1933	58,000,000
1925	124,000,000	1934	64,000,000
1926	120,000,000	1935	70,000,000
1927	140,000,000	1937	115,000,000
1928	130,000,000	1938	90,000,000

It is apparent that the exports, visible and invisible, of maritime industries were far larger than that of any other group, and it is equally obvious that, owing to the sacrifice of half our investments overseas, which brought in £200,000,000 annually, these maritime exports will in future be even more essential to the economic prosperity of these islands. Without them all hope of balancing the national trading account must be abandoned, and that means that, failing the wherewithal for the purchase of food and raw materials from overseas, the standard of living must fall and industrial activity in factories and workshops be restricted owing to the want of supplies to be converted into manufactured goods.

The gravity of the shipbuilding situation arises from the experience that the orders of British shipowners can provide employment for only about half the normal number of workers ; the rest are dependent on naval work (25 per cent.) and orders from overseas (also about 25 per cent.). As there is no expectation that the Admiralty will build new men-of-war for the time being, the importance of contracts from oversea customers is greatly increased. Can they be obtained? Sir Amos Ayre, the Chairman of the Shipbuilding Conference, has pointed out that the competition will be keener than ever before. He estimated, when speaking last spring at Glasgow (the James Watt Memorial Lecture), that the capacity of the yards in Britain and Northern Ireland was about 3,000,000 tons a year, and of foreign shipyards approximately 6,000,000 tons per annum, while the replacement ships required to maintain the present level of world tonnage (80,000,000 tons) would be of only about 2,400,000 tons. In those circumstances, even if no bounties or subsidies were to be paid in order to encourage shipowners overseas to build in establishments of their own countries, the competition would be more intense than ever before. Such orders as may be available will go to the shipbuilders who can quote the lowest prices. In spite of warnings, the trade unions claimed, earlier in the year, that the working hours should be reduced—a five-day week being adopted without loss of pay, which was raised by 5s. a week in April 1946 in the case of men. The employers protested that the industry, with the certainty that it would soon have to compete in a buyer's market, could not afford the concession. Unfortunately, a five-day week had already been conceded to engineering craftsmen, many of whom work in the shipyards. Eventually the matter was referred by the Ministry of Labour to

a Court of Enquiry. In the result, it was decided that, in view of the fact that shipbuilding was an open-air industry, subject to interruption owing to bad weather conditions, a 44-hour week should be worked over five-and-a-half days during four months of the year (November–February) and a five-day week over the remaining eight months. The report stated “that just as the engineering industry accepted the principle that the five-day week, which is now normal, be adjusted where necessary to the particular needs of an establishment, so the shipbuilding industry, involving a higher proportion of outdoor work, should accept the principle that the five-day week should be adjusted to meet the longer hours of darkness in mid-winter.”

In these circumstances, on the assumption that output is reduced, even if not as much as the cutting-down of the hours of work, a further burden was laid on the industry which must make it more difficult for British ship-owners to finance the building of new ships* and for British shipbuilders to quote attractive prices to overseas customers. Sweden was in a position even before this concession was made to under-quote British firms by about 15 per cent. Thus the stage has been set for another slump in the shipbuilding industry, but the workers apparently place their reliance on the Government's pledge of full employment.

British shipping has also been handicapped by a new manning scheme, which was apparently accepted by owners so as to avoid a strike of officers and men, among whom there was considerable unrest earlier in the year. In February it was announced that, after lengthy negotiation, the National Maritime Board, on which owners and seafarers are represented, had agreed upon a scheme which would, to a great extent, end casual labour conditions. The scheme will enable as many seafarers as possible, after a qualifying period of sea service, to look to the Merchant Navy for a stable and attractive career and greater regularity of employment, and give shipowners efficient and reliable personnel to man their ships. Higher rates of pay, as well as improved conditions of service, have been established under another agreement. The essence of the scheme is to provide a two-year contract, renewable for further periods of two years, for shipmasters, officers, and ratings who are willing to undertake, on their side, to serve for two years either in the industry generally or in a specific company. When off-articles and not working by a ship, “an established employee” will be required to hold himself available for appointment to a ship and will, unless he is under contract with a particular shipping company, be paid an “establishment benefit” which will normally be a supplement to unemployment insurance benefit. Provision is also made for payment during approved courses of training and for sickness benefit over and above the national insurance rates. Those under company contracts will receive not less favourable terms than those under the general scheme.

By accepting this scheme British shipowners have given a lead to their competitors throughout the world, but whether that lead will be generally followed is, at least, open to doubt. If other countries reject the Merchant Navy Established Service Scheme, the additional cost involved in the reform, generally regarded as desirable, will make it more difficult for the British shipping industry to hold its own on the trade routes with countries which are, owing to lower operating costs, more favourably placed to quote low freights.

* In January last, Mr. W. C. Warwick, Chairman of the Houlder Line, stated that for a ship of the same design as one built in 1938, his firm was paying 135 per cent. more.

Such is the general picture of the present position and possible future of the maritime industries of this country. British shipbuilders and ship-owners (the latter with higher operating costs and delays in loading and unloading) are obviously disturbed by the prospects, particularly as in many cases their competitors will not be private firms but governments prepared to back their own nationalised industries to practically an unlimited extent. They believe, however, that in the long run efficiency will turn the scale. If experience proves that this is not the case, the Government may be compelled to revive the Bill of 1939, which, with some amendments, would enable them to hold their own. That is a course which would be unwelcome, but it is obvious that an island country must have at its disposal an adequate volume of tonnage to meet its needs in peace as well as in war.

ARCHIBALD HURD.

CHAPTER V.

COLLABORATION OF SEA, LAND, AND AIR FORCES.

THE title "Combined Operations" for this chapter has been deliberately avoided. If that which has been chosen appears clumsy by comparison, its scope is wider. "Combined Operations" signifies, as a rule, tactical collaboration and, in the majority of cases, a forced landing carried out by land forces under the cover and with the co-operation of sea forces in older times and in recent times of sea and air forces. Here the intention is to cover a broader field, in which, however, collaboration is no less vital, though it may be less direct. In the First World War the British Expeditionary Force was carried to France and there built up to a great army of millions through well-equipped French ports and base camps, and there was no tactical collaboration with sea forces, unless we include a few bombardments of the German-held coast. In the same war the Mediterranean Expeditionary Force carried out an assault landing on the Gallipoli peninsula, never succeeded in clearing even this narrow strip of land, and was frequently supported in its operations by the fire of naval guns. Yet collaboration with naval forces was as important in the former case as in the latter. It would have been as impossible for the B.E.F. to land in France, certainly for it to be maintained and reinforced in that country, as it would have been for the M.E.F. to land on the Gallipoli peninsula without the collaboration of the Navy.

This is true even if the factor of sea-borne supplies from distant countries be disregarded, as it might to a certain extent be in the case of a belligerent which approached the point of being self-sufficing. The Army might never lay eyes upon a warship—and vast numbers of troops between 1914 and 1918 never saw one bigger than a destroyer—and yet be dependent for its safety while crossing the water not on destroyers and small craft alone but also upon capital ships stationed hundreds of miles away. The conception is perhaps a commonplace to readers of this Annual, but it is one which does not always strike home to the minds of the general public, even that of the United Kingdom, which possesses, as the result of experience and tradition, a better comprehension of these matters than the peoples of most countries.

Nor does this mainly strategic collaboration exhaust the forms which collaboration may take. It has conferred upon this country a wide choice in objectives and theatres of war. Sometimes, indeed, the choice has been too wide, so that we have been tempted into ventures by the ease with which they could be carried out by combined sea and land forces without sufficient consideration of their value to our cause or that of our allies. And yet this freedom of choice has often proved a precious gift because it has enabled us to attack our foes in theatres such as Egypt, Sicily, and the Iberian peninsula at periods when our land forces were incapable of affronting the full strength of the enemy on the main body of the European continent.

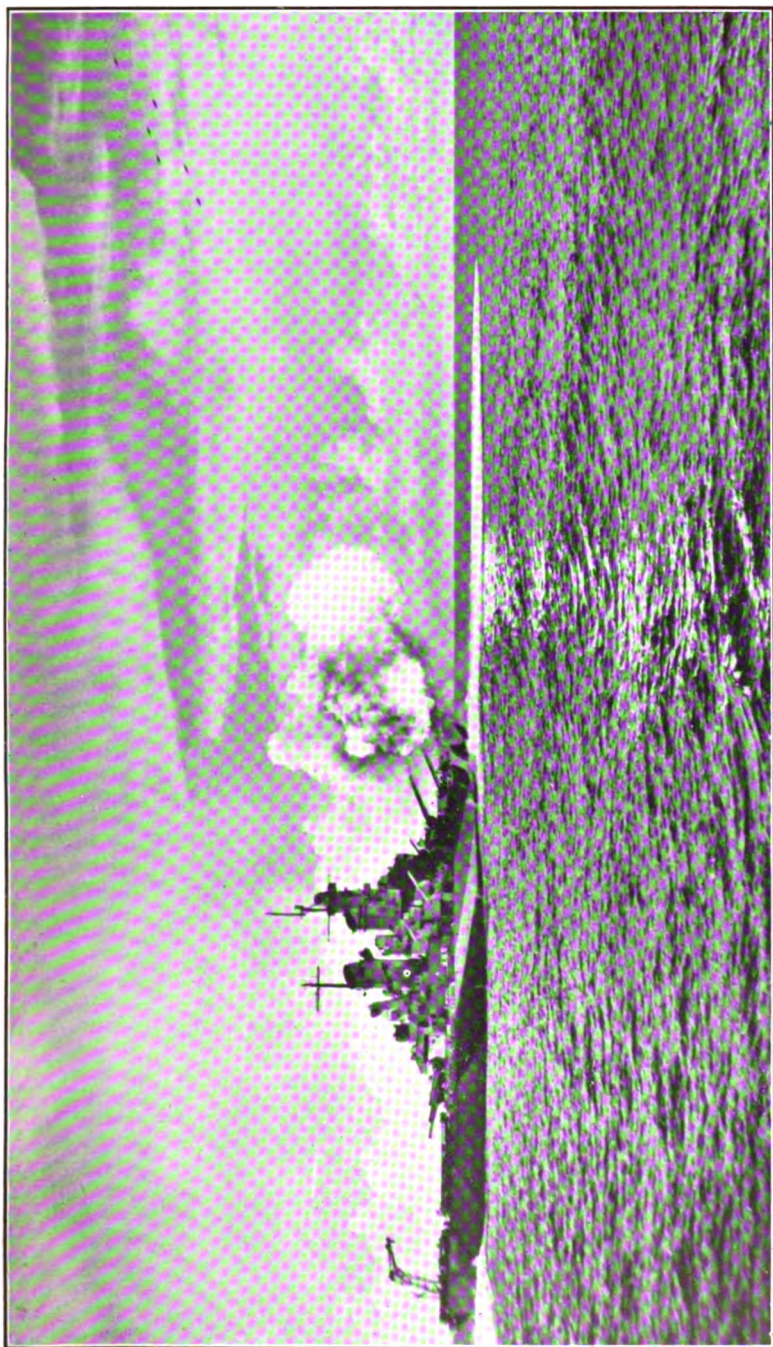
Another privilege of sea-land collaboration has been the power to shift overseas bases in the course of a campaign. This may be of great value to exploit success. It was so when Wellington shifted his base from Portugal

to Santander and other ports on the north coast of Spain in 1813, thereby forcing the French to fight parallel to their lines of communication and enabling him to inflict upon them the first great disaster they had endured in the peninsula at British hands, though they had been heavily defeated on several occasions. It may be equally beneficial in time of adversity. This may be illustrated by the situation in 1914, when the British Expeditionary Force was retreating from Mons towards the Marne, suffered the severance near Amiens of its supply routes from the Channel ports, but was supplied without serious difficulty by the prompt transference of its base to Biscay ports. In this case the base was brought back to the Channel ports with equal promptitude as soon as the need arose.

Finally, there have been cases in which naval collaboration has enabled an army to maintain itself in a fortress, or a fortified piece of country equivalent to a fortress, where it could not otherwise have put up a prolonged resistance to an enemy in superior strength. The most notable instance of this is Wellington's withdrawal before Masséna behind the lines of Torres Vedras. Much has been written of the British commander's skill in choosing this position and of his zeal in fortifying it. Both were remarkable; but the key to the position was the Tagus and the port of Lisbon. While supplies came in there under the protection of the British fleet Wellington could keep his army fat and watch that of Masséna starve.

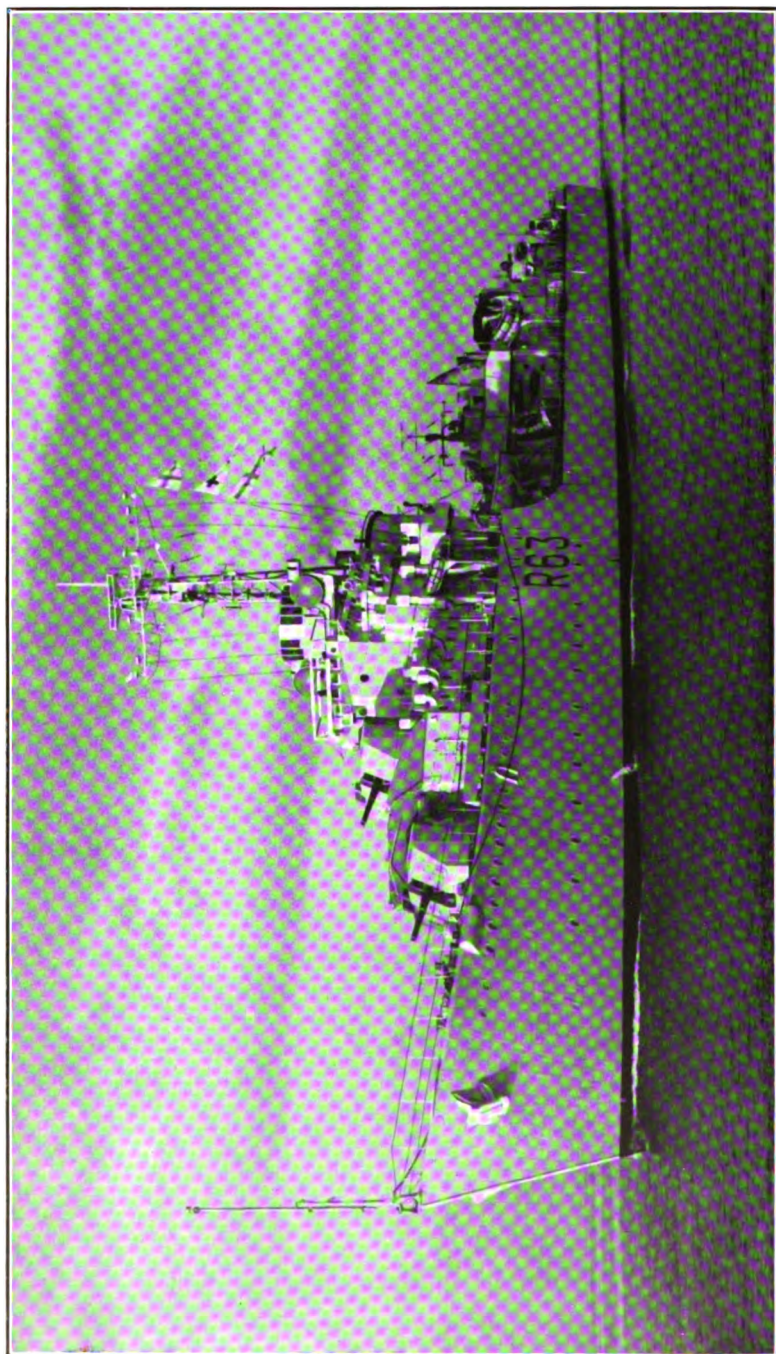
Mark, however, what happened in a similar situation when collaboration broke down owing to the temporary ascendancy of the hostile sea power. During the War of American Independence Cornwallis withdrew to the peninsula between the York and the James rivers. The chief differences between his position and that of Wellington in Estremadura were that he had less time for fortification and was weak numerically, so that reinforcement was an urgent need. The British fleet under Graves was driven off by the French under de Grasse, who then calmly returned to the Chesapeake to blockade Cornwallis. The defeat could not be called a heavy one, but it was decisive in effect. Graves did not venture to return until he had received naval reinforcements at New York, and ships came in slowly, in ones and twos. At last he got his land forces embarked and sailed, but too late. Despairing of relief, Cornwallis surrendered at Yorktown. Thus occurred one of the worst disasters in British military history, which made the issue of the war inevitable.

Other concrete instances could be given to show how much wider is the conception of collaboration between the fighting arms than that of combined operations in the usual sense of the term, to show also that sea power must be a predominating influence in campaigns in which land forces are carried to their destinations, supported, or supplied across the water. And in fact large-scale forced landings are a less prominent feature of British history than might be presumed. Mass armies date at earliest from a century and a half ago; it might indeed be said from thirty-three years ago. Before their day it was generally possible for an invading force to land without having to face serious opposition, owing to the small numbers of the defending force in proportion to the territory it had to cover and the length of coastline which it had to watch. Before 1914, in fact, the experts were inclined to study assault landings in terms of ten to twenty thousand men. The plan for the landing in Normandy in 1944, providing for a simultaneous assault on the coast by the equivalent of eight brigades, three airborne divisions, and "oddments" in considerable numbers, pro-



U.S. Battleship Missouri in action off coast of Japan. Salvo of 16-inch shell can be seen in flight.

Official U.S. Navy photograph. By courtesy of Navy Department.)



H.M. Destroyer Concord.
(Courtesy of Messrs. Thornycroft.)

viding also that on the fourth day there should be ashore seven infantry divisions with extra armoured forces and the three airborne divisions, would have astonished them. The Gallipoli landings, though that campaign eventually failed, were a pointer to future developments ; but it was the Second World War which made the great assault landings familiar and which witnessed so striking an advance in their technique.

It was in this war, too, that the third element of modern war began to play a great part and that the air arm attained to an equal partnership in collaboration. In the First World War it did not possess the power, and the Gallipoli campaign in particular would have been very different from the point of view both of attack and defence if it had. Strategically, by attack upon the enemy's communications, frequently starting weeks or even months before the landings, the air forces prepared the way. Then came the tactical phase, when they covered the approach of the convoys to the beaches on which the landings were to take place, bombarded the fixed coast defences, attacked the enemy's columns moving up to repel the invasion, dropped units or formations of parachutists, and landed airborne troops to cover the seaborne land forces or to seize important objectives upon the avenues by which these were destined to advance. The above is only the bare skeleton of the rôle of the new arm in combined operations. Scarcely less important was its task of reconnaissance, including photography, by which details of the landing places not to be found on charts could be verified. It might fulfil other tasks, for example, that of putting out of action the radar apparatus of coast batteries, so that if these were subsequently blinded by smoke-screens it became impossible for them to engage attacking warships, while the latter could engage them with the aid of radar through the smoke.

In the broader field of collaboration which has been indicated the value of air forces became equally great. Flown either from land bases or from the decks of carriers, they kept open for the passage of warships or convoys sea routes which could otherwise have been used only at the cost of prohibitive losses or even closed altogether by the enemy's action. As the Second World War progressed the technique of close co-operation between them and surface craft and even with submarines became highly developed. In the central Pacific, in particular, methods hitherto unknown were perfected by the combined forces of the United States, but that subject must be examined further a little later on.

There is no intention here of introducing inter-service or " ideological " disputes as to the relative contribution of each arm to the success of all three in collaboration. The weakness of all exclusive claims lies in the fact that collaboration so largely increases the sum of the united efforts. If x , y , and z be respectively the achievements of sea, land, and air forces, the sum of these achievements when combined and co-ordinated is not $x+y+z$, but a considerably higher total. In the same way, if one of these three elements be withdrawn, the loss will be considerably greater than the amount which it represents. Thus towards the end of 1941 the British situation in the Mediterranean was relatively favourable. Then the Germans " turned on the heat." In November they brought U-boats into the Mediterranean. On the 13th they sank the aircraft carrier *Ark Royal*, on her way back after a cruise to her station at Gibraltar. On the 25th it was the turn of the main Mediterranean Battle Fleet, based on Alexandria. The battleship *Barham* was sunk off the Egyptian coast. Perhaps even more important was the enemy's heavy air onslaught, chiefly from Sicily,

against Malta. Here Captain Agnew had been based in the cruiser *Aurora*, with "Force K," of cruisers and destroyers.

He had been having brilliant success against convoys bound for North Africa ; in particular, he had just destroyed a complete Italian convoy of nine cargo ships and a tanker. The result of the German air attacks on Malta not only weakened British air action in the central Mediterranean, but also made it impossible for Agnew's force to continue operating from Malta. Coupled with the other losses suffered in this black phase, all this amounted to a heavy British set-back.

What was the effect ? A German writer who was largely responsible for the enemy's Mediterranean strategy at this period claims that throughout the month of January 1942 not a ton of Axis shipping was lost on the African convoy route. This was due to the weakening, almost to the point of temporary elimination, of factor *x*, the naval contribution. Factor *y*, General Auchinleck's land forces, contrived to complete a successful offensive which carried it through Cyrenaica to the shore of the Gulf of Sidra. Factor *z*, the Royal Air Force in the Mediterranean, had suffered no loss of supremacy in Africa. But sufficient supplies reached the Axis forces in Libya to enable Rommel to turn upon the Eighth Army and compel it to fall back to the Gazala line. More than that, they then enabled him to re-equip completely his forces, and especially the famous German divisions of the Africa Corps. Late in May 1942, he renewed the offensive in full strength, won a great victory with immense captures of men, material, and stores, and drove the Eighth Army back to El Alamein. Probably only a little extra strength would have been required to carry him on to Alexandria and the Nile Delta. And just as the weakening of naval power in the Mediterranean had adversely affected the land forces, so now the defeat and retreat of the land forces had highly unfavourable repercussions upon the air forces, which were deprived of their desert bases ; and this reverse had a further reaction upon the naval forces, since the German *Luftwaffe* approached more closely their base of Alexandria and rendered its use dangerous, whereas the Royal Air Force could no longer support them along the Libyan coast. So closely intertwined were the fortunes of the three arms in the central and eastern Mediterranean in those days.

Similar influences went to work after the victory won at El Alamein and the advance of the Eighth Army across North Africa. This involved a heavy commitment for the Navy, which had arduous work in supplying both the Eighth Army and the Royal Air Force and in reopening demolished ports for the purpose ; but it was one thankfully accepted because its compensations were so splendid. Following in the wake of the Eighth Army, the Royal Air Force established its bases further and further west, while the *Luftwaffe* was pushed in the same direction. The strain was taken off Malta and the island's three little airfields turned from the rôle of grim defence to that of triumphant attack. All along the coast the Navy could now obtain air support up to some fifty miles ahead of the vanguard of the Eighth Army, until finally the point was reached where fighter aircraft flown from Tunisian airfields could cross those flown from airfields behind the Eighth Army. The establishment of air supremacy in the western Mediterranean proved of great service to the Navy in its subsequent blockade of the Tunisian coast, as a result of which the whole Axis force in the country, utterly defeated by the combined efforts of the First and Eighth Armies, the Americans, and the allied air forces, was trapped,

whereas otherwise a fair proportion of it might have escaped to Sicily or Sardinia.

Surely it is a niggling, an unworthy, and even an impossible task in circumstances like these to assess the precise contribution of x , y , and z or to argue which should be described as the predominant arm. The wonderful strategic success attained was a success of collaboration which added something to the strength of each arm. The campaign has been selected because, conducted along a coast as it was, with no large forces ever moving far away from the sea during the whole of the Eighth Army's advance, it is a singularly good instance of the collaboration of sea, land, and air forces; but the same elements are to be found in many another campaign, though they may not emerge so clearly.

In the Pacific the war against Japan exhibits certain similarities, amid a number of differences, to the features of the Mediterranean campaign which we have just considered. The Japanese had long studied the technique of combined operations, and they put their doctrine boldly and vigorously into effect. Favoured though they were by the weakness of the opposition after the success at Pearl Harbour and the sinking of the Prince of Wales and Repulse, they displayed a high degree of skill in the conquest of the land masses and the islands which were to provide them with their vast perimeter of defence. Collaboration between the three arms could not have been carried to a higher point. All their operations were based upon it, and it rarely broke down until opposition began to stiffen. Then it was discovered that there was an element of rigidity in their plans which prevented adaptability. For example, when their naval forces had suffered a rebuff, the troop convoys were apt to proceed with their undertaking as though no such accident had occurred, and on several occasions this cost them dear. Yet the fault was probably one on the right side, and certainly better than over-timidity. There were actually instances in which, despite the risks involved, they succeeded in putting ashore a large proportion of the land forces in such circumstances.

Before considering in what degree Japanese theory differed from our own and that of the Americans, it is worth while to glance at the individual measures of the three arms as they are generally accepted. Each has as its object the destruction—absolute, if possible, if not in the conventional sense of crippling—the opposing arm of its own type. Naval forces aim at bringing the hostile fleet to action and dealing with its menace once and for all. Land forces seek to bring on a battle in the circumstances most favourable to themselves in order to inflict the heaviest possible defeat upon the enemy. Air forces cannot produce the best results from collaboration with the other arms until they have, as the phrase goes, “won the air battle.” For them it is rarely possible to destroy the hostile force as thoroughly as the other arms may, with good fortune on their side, but they can achieve such a supremacy as a result of winning the air battle that they can thereafter set about their business of collaboration with easy minds and at the same time ensure that the other arms will not be interfered with seriously by the enemy's air forces.

There is, however, this difference in the procedure. In these days both the naval and the land forces fight their battles with the co-operation of the air forces, whereas the air forces, setting out to win the air battle, fight alone. It would therefore appear that air forces occupy a special position, that they are independent of the other arms and to that extent the predominant arm. In point of fact, air forces are so rarely independent that

the cases in which they are may be left out of account. Their bases are protected and in many cases acquired by the action of the other arms. Their fuel has frequently—almost always where British air forces are concerned—to be carried to them over the water. Short-range fighter aircraft, the first requirement of every air arm, are often enough actually themselves carried to their stations in crates. The intervention of the other arms in the air battle is indeed not commonly tactical, but it is strategic and it is vital.

While there is no serious conflict of opinion as to the rôle or the aims of the land forces, this is not altogether the case with the two sister arms. As regards the air forces the pros and cons of what is known as strategic bombing have been and continue to be hotly debated. From our present point of view, however, there is not much to be said on this subject, important though it be. All that can be said is that strategic bombing, by reason of the resources which it employs, must reduce the effort of the air forces operating in direct collaboration with the other arms. It can be described as indirect collaboration, and it then becomes a matter of assessing its value as opposed to that of direct and of determining the proportions suitable to be devoted to the two tasks, presuming both to be necessary. This is a difficult and interesting subject, but it is not ours.

The case of naval forces comes closer to our field of enquiry. The general British—and American—doctrine has always leant heavily towards the ideal of seeking out and destroying the enemy's fleet. Yet there has been in the background, since it was enunciated by Arthur Herbert, Lord Torrington, in the late seventeenth century, the conception of "the fleet in being," which is, in brief, that an enemy, even if superior in naval strength, will not attempt invasion of a country whose naval forces remain intact. Perhaps this conception does not really conflict with the ideal of seeking out the enemy's fleet; it may even be described as the obverse of the medal. Yet it does lead on to a doctrine of which the foremost expositor a generation ago was a well-known writer on naval affairs, Sir Julian Corbett, and which is essentially foreign to British ideas. Revolted against what he considered the extreme views of the "Blue Water" school of thought, so called because its adherents held that naval war should be decided in battle on the open sea, Corbett declared that the essential rôle of the Navy was not, in fact, to seek out and destroy the enemy, but to keep open the sea communications of the country and close those of the enemy.

Now it is natural that nations which could not hope to dispute the mastery of the seas in war should evolve theories designed to make the best of things. Up to the battle of Trafalgar the French had always waged naval war on theories similar to our own, that is, though they allotted a greater rôle to the *guerre de course*, they were prepared to dispute the command of the sea. They did not often succeed in attaining it, but they did gain command in home waters for brief periods—under Tourville and Château-Renard in the late seventeenth century, in the Far East under Suffren, and in North American waters under de Grasse in the late eighteenth century. (It may be noted too that they put these rare successes to good account in collaboration, in the first instance by landing an army in Ireland, in the second by conquest in India, in the third by bringing about the surrender at Yorktown already discussed.)

Since Trafalgar France has always accepted the impossibility that she should possess a navy capable of disputing the command of the sea with

Britain. Her ideas were also powerfully influenced by her experience in 1870, when she was opposed by a nation virtually without a navy and had no use for her own except for defence, for which half its strength would have sufficed, since the new network of Germany railways to move reserves seemed to render invasion of hostile territory impossible. This caused French thinkers to take the view that sea power was rapidly declining. The so-called *Jeune École*, which looked for success against Britain in a flotilla of fast torpedo-boats, became for a time predominant in the French Navy. A section of this school toyed with the idea of invading Britain under steam—independent of wind and almost independent of tides—under the protection of such a flotilla, and thus reintroduced the old principle of collaboration.

There is no time to consider here how French theory evolved, how Castex reconciled the bold strategy of Mahan with the more timid strategy of the *Jeune École*, so that France was enabled in the First World War to play an honourable though secondary part in establishing command of the sea, transported her African troops to her own country, carried French and African troops to the eastern Mediterranean, and undertook forced landings on the Asiatic shore of the Dardanelles and on the Gallipoli peninsula. Nor need we follow German theory through its various evolutions and conflicts, from the effort of Tirpitz to create a fleet which could affront British power to the retrogression of Hitler towards a pure *guerre de course*—in which, however, capital ships were designed to play a part. This article is concerned with collaboration between arms, rather than with sea power alone; and these few remarks have as their object an introduction to Japanese theory and its effect upon the fighting in the Pacific during the late war.

The Japanese paid lip-service to the principles of Mahan, so that it was generally assumed that a Japanese fleet would seek a decisive engagement at the first available opportunity. On the contrary, if acts rather than words be taken as evidence, the Japanese have been more inclined to act upon the doctrine of "the fleet in being," and, in the words of the American writer, Alexander Kiralfy, "the Japanese Navy has been a floating wing of a powerful army occupied with offensive operations."* Mr. Kiralfy points out that in the war of 1894–5 against China the Japanese broke off action with the Chinese fleet at a moment when the total destruction of the latter was threatened. He quotes the official report on the first phase of the war against Russia in 1904: "The Japanese combined fleet had successfully made a *threatening* movement against the enemy's fleet, causing them to *abandon* their departure from Port Arthur." The Japanese certainly understood the principle of collaboration, but they hardly looked beyond it. In the subsequent battle of the Yellow Sea Togo again broke off action at nightfall and reported that his success had "dealt a severe blow to the enemy's *plans*." The almost simultaneous action against the Russian cruisers from Vladivostok ended similarly, Kanimura breaking off the action when all three had been damaged and one was stopped. Finally, in the battle of the Tsushima, against the Russian Baltic Fleet, though the result was annihilating, this appears to have been due largely to the miserable training, poor leadership, and bad material of the Russians, the main idea in Togo's head being to prevent the fleet reaching Vladivostok. He himself said afterwards of this battle: "I counted

* "Makers of Modern Strategy." Edited by Edward Mead Earle. (Princeton University Press.)

upon *harassing* the enemy, but the battle, fought so courageously by our men, thanks to divine aid obtained the great result."

Whether or not Japanese naval strategy in the Second World War was correct must be a matter of opinion. Perhaps, however, enough has been said to suggest that it was nearer to tradition than was at the time supposed by American and European observers. Probably we should not be as surprised as we were either at the manner in which the enemy refrained from pressing home an initial advantage—at Pearl Harbour, for example, or, on a minor scale, after a successful "run-in" attack on a cruiser squadron in the Solomons—or that he did not pick up the glove and challenge the Americans to decisive action until they had landed in the Philippines. Many observers had expected with some confidence that the decisive struggle for command of the sea would come earlier, but it seems doubtful whether the Japanese seriously contemplated the possibility.

The Americans, on the other hand, while committed to a strategy in which the closest collaboration was necessary, of which indeed collaboration was the foundation, had always in their minds the prospect of bringing on decisive naval action, even long before they had attained the great superiority which they secured in the later stages. They had to overcome the difficulty that their major combined operations might involve dispositions not ideally suited to a fleet action. It may be that they were not ideally positioned when the Japanese attacked them in the Philippines; but weak Japanese strategy in the dispersion of the attacking forces, weak tactics in denuding the northern fleet of aircraft by flying them off the carriers at too early a stage, superior American radar equipment in the reconstructed battleships, the previous Japanese losses in carriers not wholly made good, decided the issue and allowed the invasion to proceed, after MacArthur had stood fast to await the result of the battle. Defeat would have been fatal for him, since it would have involved the loss of his transports and supply ships and thus the ruin of his army. In playing for a stake as big as this was, heavy risks cannot be avoided.

There were certain differences in the nature of the operations in the central and south Pacific. In both cases the American advance was carried out in a series of bounds from one strategic point to another in which all three arms were employed. The choice of these was governed by their suitability as air bases or fleet anchorages or as both from which to carry out the next bound. Frequently selection fell upon a site where the Japanese had already prepared an airfield. But whereas in the central waters of the ocean the islands are small and widely scattered, in the southern there are considerable land masses. The island of New Guinea, the main line of advance of General MacArthur's Australian and American land forces, is the better part of 1,600 miles long from East Cape to Cape Selee. There were thus better prospects of effecting landings without major opposition on the southern line of operations than on the northern. The battles for the coral atolls on the latter were always fierce and bloody. Their small size pushed the factor of surprise into the background, since the defence was always in position for resistance. The Americans therefore instituted a system of fairly prolonged and immensely heavy bombardment from the water and from the air—in a few cases supported by artillery installed on neighbouring islands—and saturated the area of the beaches with bombs, shells of all calibres, and rockets before putting their troops ashore. The Japanese found it impossible to oppose the disembarkment directly and could only entrench themselves at some distance from the

foreshore, there to fight it out to the end. In the big islands of the Philippines surprise once more came into the picture and the issue was decided in war of a highly mobile nature. But all through these campaigns, as in Sicily, at Salerno, at Anzio, and on the coast of Normandy, a remarkable and to some an unexpected feature was the direct support given to the land forces by the ships' guns. And in the Italian campaign there were occasions when only a limited amount of protection could be afforded to the warships by aircraft.

On the continent of Europe invasion of the enemy's territory was pushed right through, and it was conquered step by step by the allied land forces until they met the Russians advancing from the east and squeezed out the last resistance. In the Far East neither the invasion of the Japanese homeland, the greater of the two invasions projected, nor that of Malaya was required. The dropping of the atomic bombs on Hiroshima and Nagasaki ended the resistance of the enemy abruptly, so that these two further campaigns, which would have involved collaboration of the three arms on the fullest scale, remained unfought.

The atomic bomb stands as a note of interrogation to the whole future of civilisation, but, on a narrower plane, it puts the future of all the traditional arms and therefore of collaboration between them into a puzzling situation. It is a far greater menace than any normal bombing attack because, whereas 10 per cent. of casualties would put a bomber force out of action in a very short time, a single atomic bomb well placed might serve the attacker's purpose. Moreover, it may be found possible to attack with atomic bombs by means other than carrying them in aircraft over their targets. The most vulnerable of these targets are those which are large in size and compact, such as cities, and into this category must come battleships, aircraft carriers, and ports. Whatever be the future of armed forces and their collaboration, the Bikini tests and other evidence suggest that for capital ships of the type we have known the evening has come. At the same time the convoy at sea, if widely dispersed, would appear to be less vulnerable to the atomic bomb than many other targets. The worst danger to its freight may be before embarkation and after it has been landed, especially at a great port.

There is a possibility of capital ships being revived under other forms, but even if they were to pass away altogether, that would not bring to an end collaboration between the three arms. The atomic bomb does not abolish the need for armed forces, if only because the possessor would at least have to defend the territory on which it was produced and from which he proposed to launch it. So long as they are retained the three arms must continue to act in concert. In any case, it would be folly to assume at this moment, when some of the best scientific brains in the world have reached only the preliminary stages of their study of the problems of atomic energy and of the possibility of counter-measures, whether of a defensive or of an offensive kind, that the situation would remain as it was after the dropping of the two bombs on Hiroshima and Nagasaki. Other influences and discoveries may come into play and alter it considerably. As matters now stand there is no prospect of the dropping of atomic bombs in great numbers, since they are extremely difficult and costly to produce.

Meanwhile, if the United Kingdom itself is peculiarly vulnerable to attack by the atomic bomb and other long-range weapons, this is very much less the case with the British Commonwealth as a whole. Its dispersion affords it a considerable measure of safety, while at the same

time the bases and stations upon the communications which link together its parts provide means for counter-offensive, the only practicable type of reaction against these forms of attack. These bases create not only opportunities for counteraction but also a deterrent to a would-be aggressor. Their maintenance would make it possible for nations which were determined to resist the reimposition of tyranny upon the world to rally to our aid.

Just as the Americans could not have carried out their remarkable advance upon Japan across the central and south Pacific without the most intimate collaboration between the three arms, so the protection and maintenance of the Commonwealth communications and the bases upon them can be organised only upon the foundation of a like collaboration. Unfortunately it is a matter of notoriety that the collaboration attained after painful experience in war is apt to be relegated to the background in peace and that the three fighting services tend to go their own ways. This danger affects the air forces most. Naval and military authorities are so sensible of the necessity for air co-operation that they are unlikely to stray far from realities. As has been pointed out, however, the air forces fight alone on occasion and may for that reason be less impressed by the necessity for collaboration, though—as has also been pointed out—they are in point of fact no less dependent upon it. One of the heaviest responsibilities of the Ministry of Defence is the maintenance of collaboration. And it is a gross mistake to imagine that this can be done in time of peace only by means of occasional and expensive exercises. It can be furthered in the lecture room, in the examination paper, in the tactical exercise without arms popularly known as the “Tewt,” in the indoor exercise, and in the day-to-day training of the several forces.

There is no lesson which needs to be more insistently inculcated than that of the interdependence of the three arms, and even more so as regards Britain and the British Commonwealth than in the case of any other great nation of to-day. The conception is one to which it is easy to give lip-service, which it is easy to treat as a theoretical desideratum, while disregarding it in the conduct of practical affairs. This is no matter of theory; it is, in fact, a matter of life and death. A number of those who realise this strongly and are nervous about the prospect of unity in time of peace have suggested as a remedy that there should be only a single service operating the three arms. It is doubtful whether this is desirable. Training and tasks are so different that it would be impossible to force men in the three services into a single mould, and it is possible that, even were a single service to be created formally, the divergence of duties would be so great that the increased unification would prove to be no more than nominal. Nevertheless, if it should be found that the drift apart, which certainly appeared immediately after the war, was increasing and that other remedies designed to check it had failed, then it would be worth while to try this expedient as a final resource.

Various forms of machinery—such, for example, as the new Ministry of Defence—may on occasion be used to further the cause of unity and collaboration and may do good work to that end. Yet the aim can never be achieved through the medium of machinery or material organisation alone. The spirits and the minds of men provide the field in which these virtues are practised. If the ground is not favourable to them the chances that they will flourish are small. When the campaigns in the Western Desert of Egypt and Italian Libya were explained to a group of intelligent

and experienced Russian officers and they were told that the margin was just too narrow and that a couple of extra divisions would have made the whole business relatively easy, they replied : " Then why did you not bring along more chaps ? " That was because they had not had to study collaboration outside their own country or at all events far from its frontier. Factors such as the effect of the Cape route upon the turn-round in shipping, the berths available in the Middle East when things were going unhappily in the Mediterranean, the effort needed to maintain two corps as far afield as El Agheila, the extent to which the enemy's reinforcement and maintenance difficulties were lightened when it became impossible for us to use Malta as a naval base—these and others did not occur to them. In them these blind spots might be forgivable, and they were doubtless experts on matters of which British officers are relatively ignorant. For us there could be no forgiving in such a case. This is the realm in which British officers of all three services should be most completely at home, not in conception only but also in action.

CYRIL FALLS.

CHAPTER VI.

THE FUTURE OF NAVAL AVIATION.

DURING the six years of war from 1939 to 1945 drastic changes have taken place in the weapons and tactics of naval warfare. At no time in our history have such changes been witnessed during the course of a single war. Many people had foreseen that science would bring about great developments, particularly from the use of aircraft ; but science alone was not the cause. The rate at which developments succeeded one another, due to the prodigious amount of flying that took place and therefore the amount of experience gained, due in turn to the immense expenditure of money on these weapons by all the combatants, was probably a more important factor than any other. Naval officers and many others are now asking themselves how much these developments will affect the future, and especially the more immediate future of naval aviation. It is proposed here to consider very broadly what changes have so far taken place, how they themselves are affecting the present and the near future from a personnel as well as a material point of view, and in what direction we seem to be heading our policy in both respects.

Naval strategy, usually so little susceptible to evolution in weapon design and naval tactics, has, owing to the very extended use of aircraft had to undergo some important modifications during the course of this war. The most tangible and important result which technical air progress has had on naval aviation up to date is that it has raised it to the place of highest importance among the specialised branches of the Navy of to-day, as evidenced by the size of the " Air " allocation in money and personnel allowed in the Navy estimates of 1947.

The sea battles of Midway and the Coral Sea opened a new era in fleet actions at sea, demonstrated the tactical power of carrier-borne air striking forces, immediately proved the diminishing probability of future visual-range gun actions between battleships in equally matched fleets, turned the aircraft carrier into the real capital ship of to-day, and virtually converted the tactical function of all large gun-carrying ships into surface escorts for the carriers. But of course the power of the naval aircraft is by no means confined to the striking of blows in actions between the main fleets. Though not, perhaps, their most important, their much more frequent employment is in other fields of naval work, reconnaissance, defence against air attack, and the protection of shipping against submarines—these are probably the most important of their other duties. In air support for the army in long range assault operations, carrier aircraft also proved during the late war their indispensability in yet another rôle.

It is yet to be demonstrated how far present progress and trends in the design of carrier aircraft will go, but there appear good grounds for conjecture that before very long improved methods of launching from and landing on carrier decks will enable these aircraft to attain higher performances as interceptor fighters and in other special rôles than will be attained by contemporary land-based aircraft operated from an airfield. For many types of operation, in fact, these qualities coupled with the carrier's own mobility, which can of course be used to shorten the distance

between an aircraft's base (the carrier) and its target and so reduce its fuel load, may place a special demand on naval aviation in future defence strategy.

It is still difficult to do more than speculate on the possible changes in naval tactics which might follow upon the Hiroshima-Nagasaki-Bikini sequence of events. But it is not, perhaps, entirely unjustifiable to suggest that warships possess certain inherent qualities which will render them less susceptible, on the whole, than forces operating on land to the effects of atomic war. Force of circumstances in the last war has taught navies how to achieve a greater general mobility than before, and the fact that the fleet train necessary for this achievement is a very costly and elaborate organisation does not eliminate the importance of that advantage.

One of the results of atomic developments may therefore be an increased relative importance of warships, and carriers in particular (since scientific and other technical progress has already transferred the centre of gravity of a naval force from the battleship to that class), in the general strategy of the three services as a whole. There is possibly therefore some ground for expecting, as one result of atomic discoveries, to see a scaling up of all the component parts of naval aviation.

POST-WAR NAVAL POLICY.

It is suggested that the correct starting point for determining naval air policy is to assume that conditions exist in which the full strategical defence requirements have to be met. It is now very generally recognised that the last war has radically changed the basis upon which air requirements must be calculated for any given naval commitment. Before 1939 British naval air requirements were assessed primarily on the assumption that there would be a main fleet action and that the air requirements for this would be mainly borne by the aircraft carriers attached to the fleets, some of the rôles requiring small detachments of aircraft, such as spotting and action observation, being carried out by catapult aircraft carried in the battleships and cruisers. The various duties of aircraft in the navy were therefore almost entirely specialised for the requirements of main fleet operations, by far the majority of them being dual purpose (Swordfish) aircraft equipped either for searches and reconnaissance as required by large fleets in waters where enemy surface forces (or submarines) might be met, or for carrying out "strikes" against the enemy fleet when discovered, with the object of impeding his escape from later destruction by gunfire. The classic example of this type of operation by aircraft on a numerically small scale was that which led to the destruction of the Bismark in May 1941. The aircraft employed were Swordfish and they carried out their dual rôle of search and strike with model proficiency, a truly astonishing feat for a biplane of ten-year-old conception and a normal operating speed of about 90 knots. The most usual weapon of attack in such strikes was, of course, the torpedo, which has always been a more effective instrument of attack against a moving target than any kind of bomb.

The general consequence of this air policy was that the design and equipment of the majority of naval aircraft, and the training of their crews, were aimed almost exclusively at meeting the needs of heavy ship actions. The tactical principle applied to their use demanded that the primary objective of a strike should be any enemy aircraft carrier present, as a means of preserving our own ships from enemy carrier-based air attack—

a sound enough policy so long as aircraft were only considered fit to play a rôle secondary to the heavy gun. Carrier fighters were provided on what would now be considered a surprisingly small scale, and their assigned duties were limited, first to protecting our own spotting and observation aircraft and second to defending our fleet by interception of enemy air striking forces—a somewhat problematical achievement having regard to the fact that our naval fighters before the war were in fact slower than almost any bomber the enemy would have been likely to send against our ships. It was, however, fully recognised that neither their endurance nor their equipment suited our naval fighters for employment as bomber escorts for the strikes dispatched by the carriers.

Early days of the war provided little experience upon which to alter that policy, particularly when such a striking instance as the Bismark action seemed to confirm it. Soon, however, the absence of aircraft suitable for duties which were making very different demands in training, design, and equipment, began to be felt. The principal directions in which the war was demanding changes were for anti-submarine aircraft on the trade routes, particularly with convoys, and for high performance fighters in the defence of both warships and convoys against air attack.

"Fleet-action-mindedness" was not the only factor which had retarded our development of carrier aircraft suitable for these two particular functions. In fairness it should be said that, until ship-borne radar and improved radio-telephony were available for use at sea (late in 1940), interceptions by naval fighters were impracticable; even after that date it was necessarily a very long time before all our ships could be equipped. In regard to anti-submarine work, until radar and good anti-submarine missiles, such as a reliable depth-charge for aircraft and the rocket projectile became available, air attacks against submarines were singularly ineffective.

Nevertheless, had a broader policy been applied to pre-war air work the development of better equipment and training might well have come earlier than it did. That such a large proportion of aircraft, as in the naval service, was devoted to a very exclusive line of employment was a fault by no means confined to the Navy. It may not be an unreasonable criticism to say that the Royal Air Force concentrated on bombers at the expense of some of its other responsibilities, as, for example, support for trade defence; and that the Army had virtually only acquired aircraft suitable for observation as opposed to the many other forms of offensive support already known to the Germans. How far these deficiencies are due to an over-centralisation of air policy generally between the years 1918 and 1938, and how much to the absence before the war of arrangements for securing the co-operation of science in assessing the probable developments of modern war, is a question which cannot be decided here. It is, however, to be hoped that our post-war organisation for assessing and meeting the specialised requirements of each of the Services will not leave much room for a repetition of that kind of failure.

In the field of combined operations, which in the varying fortunes of of the British Empire throughout its history have always played an important part, the part to be played by naval aircraft was not foreseen. As events show, the successful adoption of naval carrier-borne fighters for air support of the army in this class of operation proved a deciding factor on many occasions. Operations both in the Mediterranean in 1943 and 1944, and in the Pacific, seem to indicate that amphibious operations are,

in fact, assuming a progressively greater importance as the equipment of war, both on land and sea, becomes more scientifically developed. Huge military forces can now be moved with a degree of security and speed formerly unthinkable ; major strategy must become increasingly affected by that development. In such operations carrier-borne aircraft have a particular value for two reasons. Firstly, their presence has now proved, contrary to previously held opinion, that large seaborne forces can venture right up to a well-defended enemy coast and within range of considerable enemy bomber forces. Secondly, except in operations within fighter range of our own land bases, it is solely these aircraft which can provide air support. In both the air support and the cover rôles, the feature which gives carrier-borne aircraft their most valuable quality is that which has already been referred to earlier in this article, namely freedom from the necessity of having to carry a large fuel load. The extent to which future defence plans may require naval aircraft capable of fulfilling this particular kind of duty can hardly yet be foreseen, but it may certainly play an important part in our naval air programmes.

Reference has already been made to the advent of the atomic weapon. This again may well cause an increase in the demand for naval aircraft. There seems likely to be an increased demand for efficiency in air interceptions, and a geographical extension of the areas in which they could be made. Here again the carrier-borne fighter could be called upon to fulfil a new rôle, lying outside the usual fields of naval strategy. This in fact seems to be one of the first most likely results of the new weapon's appearance. A second possible demand might be that arising from the advantages which carrier-borne aircraft could offer for the actual delivery of such missiles if circumstances were ever again deemed to justify their use. The safe flight of an "atomic" bomber to its objective over very long distances might well provide fewer difficult problems were it launched from a highly mobile base. It would appear that many fertile brains are now at work on the practicability of eliminating the necessity for a crew in such a bomber and, were this successful, it would seem that both its reliability and its security from interception in flight would be greatly increased if it were operated from a carrier. Moreover in the long-range war which we must expect next time, the "fixed address" of an airfield known to be a potential atomic launching site would be likely to provide embarrassments more easily avoided by the carrier.

There is unfortunately at the present time a popular tendency to conclude that enough has already been learned about the new weapon to justify revolutionary changes in Empire strategy, to abolish navies and armies, and to concentrate the whole defence effort on the provision of rockets and aircraft. But with its responsibility for the protection of the sea routes the Admiralty cannot afford to indulge in speculation or hasty conclusions ; false conceptions about the atom bomb might well prove more dangerous to Great Britain than the bomb itself. Moreover, war is apt to come upon us more quickly than our peace-time research and equipments can be advanced ; these are regulated less by the naval strategist and tactician than by the taxpayer, and scientific progress is very expensive. There is, in fact, probably no person in the whole of the British Empire who needs to keep his two feet more firmly planted on the ground than the Controller of the Navy. No unit of naval strength can be abandoned on the ground of its ineffectiveness or obsolescence until it can be replaced by another of at least equal and proved effectiveness for the

known tasks arising in the fields of Admiralty responsibility. This does not mean that he cannot, indeed, does not, look ahead towards changes which time and invention make necessary. The secret of our naval strength throughout our history, and in spite of periods of poverty and parsimony, is that we have never allowed ourselves to be dependent at the outbreak of a war on a naval force which is not mainly composed of units of proved value for defence against known and probable forms of attack. In peace only a proportion of our forces and training effort can be devoted to experimental work with untried units and weapons.

Hence although some remarkable material developments made their debut in the last stages of the recent war, the next few years at least are likely to see the Navy provided with air units and equipment which in the main belong to classes of which the necessity and value were proved before 1945, though they will of course in most cases have been improved in detail since that date.

NAVAL AIR EQUIPMENT.

At the time of writing naval aviation is still undergoing its transition from war to peace establishments, and from active operation to routine training. Apart from the reduction in strength, this transition is having an even greater effect on personnel than on material, and its results in this respect are dealt with in a separate section of this chapter. In regard to material the Navy's equipment both of carriers and aircraft consists still of the classes and types which were in service during the latter part of the war; and will probably remain so for the next two or three years; extensive changes cannot be expected yet. Moreover, the demobilisation programme and the effect of immediate post-war financial restrictions have been drastic, and involve keeping in fully commissioned service only a portion of the best of that great accumulation of naval air units which had been built up during these latter years in preparation for the final assault against Japan. Not only, indeed, did the termination of hostilities bring our war development programmes to an end, but the large proportion of carrier aircraft with which the Navy was equipped, and almost all of the numerous escort carriers, had to be disposed of, by destruction (in the case of aircraft) or return to the United States since they were provided under Lease-Lend. Sufficient time has not yet elapsed for the appearance of new equipment and it must be expected that this will even be somewhat further delayed until its production can embody the fully digested experience of late war operations.

AIRCRAFT CARRIERS.

British ships of this class in effective categories which remained after the end of the war or have since been completed, totalled seventeen as follows :—

Fleet carriers	ILLUSTRIOUS
	VICTORIOUS
	FORMIDABLE
	INDOMITABLE
	IMPLACABLE
	INDEFATIGABLE

Light fleet carriers	OCEAN
	GLORY
	TRIUMPH
	THESEUS
	VENERABLE
	VENGEANCE
	COLOSSUS
Escort carriers	WARRIOR (Royal Canadian Navy)
	CAMPANIA
	VINDEX
	NAIRANA

Of these seven are now in commission ; three are stationed in Home Waters, *Illustrious*, *Implacable* and *Vengeance* : two in the Mediterranean, *Ocean* and *Triumph*, and two in the Far East, *Theseus* and *Glory*. In addition to this the *Colossus* (renamed *Arromanches*) is on loan to the French Navy, the *Warrior* is in commission in the Royal Canadian Navy, and the *Nairana* on loan to the Royal Netherlands Navy, as the *Karel Doorman*. Out of the remaining ships, which are on some form of reserve basis, it is understood that three others for harbour training, trials and ferrying, will be needed to meet post-war administrative requirements.

Many other ships completed or laid down during the war for naval aviation services will remain in one or the other reserve category, but it appears very unlikely that any more will be built for some years at least. Of these the most important are the aircraft maintenance ships, *Unicorn*, *Pioneer* and *Perseus*. Their construction is basically the same as that of a light fleet carrier, and the *Unicorn* was in fact used as such during the operations at Salerno. But their flight decks are now unserviceable for the landing and take-off of aircraft owing to workshops, cranes and the superstructures which have been built on them. The need for this class of ship was seen several years before the last war when the first of these ships, the *Unicorn*, was laid down. Other ships are the aircraft component repair ships *Holm Sound*, a converted merchant vessel of about 10,000 tons, and several small aircraft transports of about 900 tons which are used mainly for the local ferrying of damaged aircraft.

Of the carriers introduced into the Service since 1939 the Light Fleet type actually represent the latest development. All the Fleet Carriers were of pre-war design, and even the last two of this category to come into commission, the *Implacable* and *Indefatigable* (in 1944), belonged in fact to the 1939 naval programme. The light fleet carriers in fact embody all of the improvements resulting from early war lessons and it has been on to and off the decks of a ship of this class (*Ocean*) that most of the new types of aircraft under recent development (e.g. *Vampire*, *Mosquito* and *Sea Fury*) have been flown. Although the total length of their decks is less than that of the fleet carriers, the actual length available for landing is approximately the same in both cases. From an operating point of view the biggest difference between the two classes of ships lies in the speeds which are about 30 and 24 knots for the larger and smaller vessels respectively. This usually limits take-off more severely than landing on, although with the assisted take-off devices now in common use, viz : catapults and R.A.T.O.G. (Rocket-Assisted Take-off Gear), all of the modern single engine types of naval aircraft which are unable to get

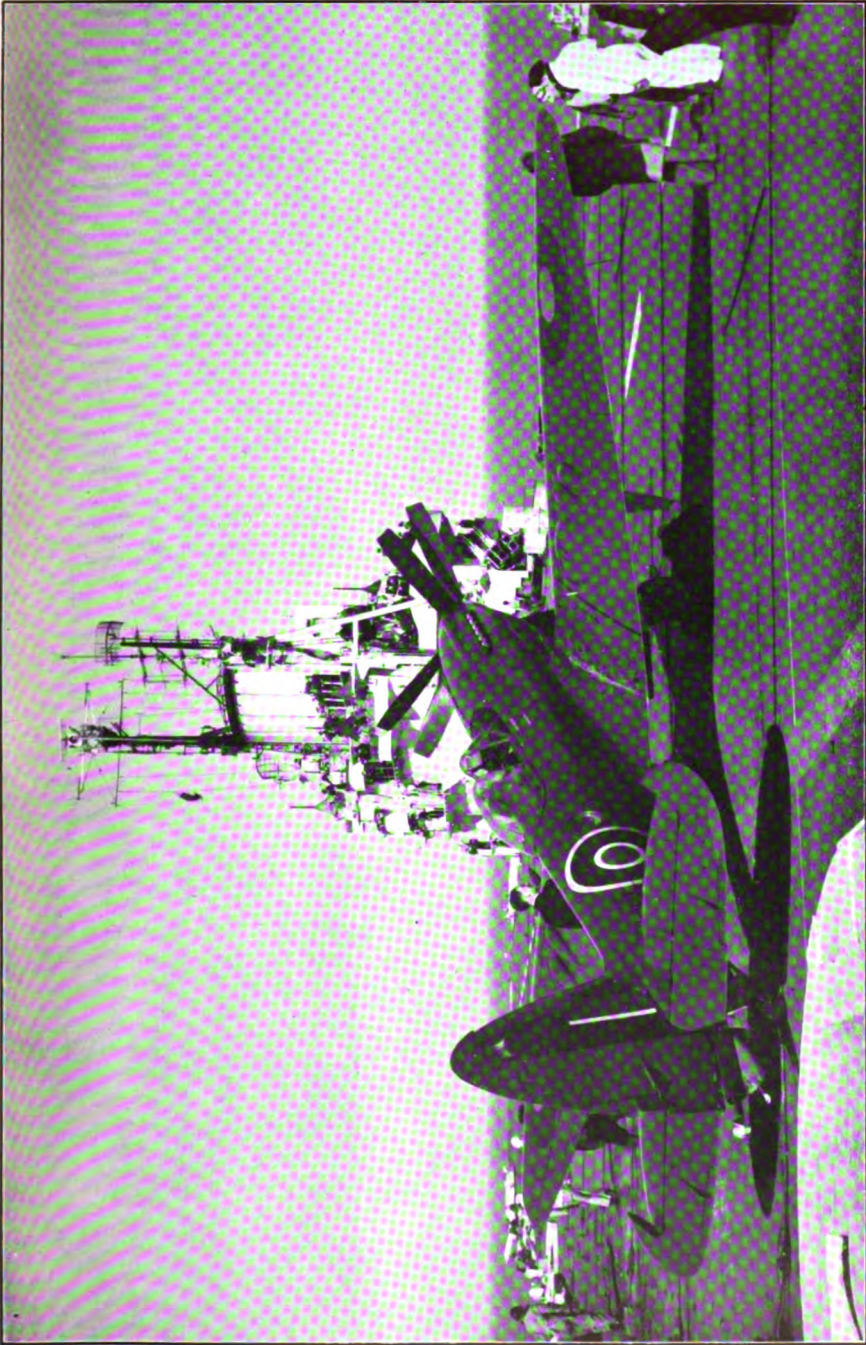
airborne by normal take-off run, can in fact still be launched from the slower ships even in very light winds.

With the introduction of the twin engine types of carrier aircraft, however, either very much more powerful catapults or greater wind speeds over the deck are needed. Even the extra length of deck available for take-off in the fleet carriers is not alone sufficient under such conditions, when the additional six knots of carrier speed is a necessity for aircraft as heavy as the Sea Mosquito under quite normal conditions.

It can therefore be expected that the new carriers, which will certainly be required to operated heavy twin engine types of aircraft, will have to exceed the Implacable Class in speed, lengths of deck or the power of the external assistance to take-off which they can apply to such aircraft, and not to fall materially below the latter in any of these respects. We have not yet, however, been given very much information regarding these new ships, especially in respect of their armament or constructional details. It can be stated that six of the new large ships will come into service during the next three to four years. The first two will be the Magnificent and Terrible of the Majestic Class, nominally light fleet carriers, and they should be commissioned during 1948. They will be followed in 1949 by our first post-war Fleet Carrier, the Eagle, which was recently launched by H.R.H. Princess Elizabeth. During 1950 other light fleet carriers one of which, H.M.S. Centaur, has been launched, should come into service. These new carriers were laid down during the later stages of the war, and their design has now been brought up to the standard demanded by any aircraft which can come into service during the next few years.

THE DISAPPEARANCE OF "CATAPULT SHIPS."

A very noticeable feature of post-war naval air policy is the elimination of the catapult ships and seaplane tenders. All catapults and aircraft hangars have now been removed from capital ships and cruisers alike, and their place taken, both in the older ships and all new designs, by increased numbers of anti-aircraft guns, and other gunnery equipment. With the changing features of naval war this step has been perhaps demanded by the sheer necessity of finding space for that equipment, and we would prefer to think that is the real reason for the discontinuation of this manner of operating aircraft. With the war-time technique both in handling that wonderfully sturdy and efficient amphibian, the Walrus, and in hoisting it on board in difficult weather, it proved itself to have great value for convoy escort in its reconnaissance function as well as in rescue duty. Many was the convoy which could not be accompanied by aircraft of any other kind across thousands of miles of submarine infested ocean, and the very presence alone of a catapult-borne Walrus proved a strong deterrent in those days to enemy submarine activity. They, and other catapult aircraft (notably the Seafox), also did much valuable work in action reconnaissance, and spotting in actions between ships which were not accompanied by an aircraft carrier. Moreover, much help can be given to the Fleet in exercises and gunnery practices by catapult aircraft, when under peace conditions ships so often find themselves in isolated places and with no carrier present. This will in the future as in the past, often be the case, since two carriers is the maximum which will for many years be attached for Fleet work on the three larger naval stations, and none at all will be available on the smaller stations overseas. Moreover, modern carrier



Seafire 47 Fighter.

(Courtesy of Messrs. Vickers-Armstrong.)



Seafire 47 Fighter landing on Carrier's Deck.

(Courtesy of Messrs. Vickers-Armstrong.)

types of aircraft are not designed for operation from floats ; in harbour therefore the carrying and fetching, and harbour exercises, in which in pre-war times catapult aircraft were normally employed, would seem to present a demand for meeting which some new arrangement which will have to be made.

NAVAL AIRCRAFT.

In regard to the aircraft with which the Fleet is equipped, the immediate future will not be marked by the opening of any new era in design and operational methods. It will of necessity rather be a period of recovery and reorganisation. The need for recovery arises mainly from the fact that during the latter part of the war considerably more than half of the operational aircraft in service were of American naval types and had been provided under the Lease-Lend arrangement. Practically all these aircraft had by the conditions of that agreement, to be either returned or destroyed at the end of the war. In addition to this was the fact that relatively little effort had been expended in the development of British naval types—the country's main resources in aircraft manufacture were diverted to the cause of the Bomber offensive. Consequently, at the present time naval aircraft are in a transitional stage—the output of older types like the Barracuda, Firefly and Seafire have had to be continued in order to make good the wide gaps both in carrier and training units which, even after necessary reductions after the war, were left by the withdrawal from service, of the Avengers, Wildcats and Corsairs ; and as yet new types suitable for operation from carriers and designed upon the basis of war experience are not available. A few intermediate types are now indeed becoming available, as for example the Sea Hornet and Sea Fury ; but these are not true naval types basically designed for carrier work or naval duty, and in their presence there is a lingering and unwelcome flavour of the twenty pre-war years of Cinderella treatment of naval air requirements. In the next four years, however, there is reason to hope that the navy's front line will be largely if not entirely re-equipped with up-to-date aircraft.

PRESENT EQUIPMENT.

Perhaps the biggest lesson of the war was the value of the single-seater for carrier work. Hence our present day fighters belong almost exclusively to this type. It is now recognised that, given an "umbrella" of efficient fighters—even of no considerable numerical strength—carriers can operate close to enemy shore bases and within striking distance of enemy carriers with a far greater immunity from vital damage by air attack than was supposed possible before 1940 or 1941. Moreover, this being the case the advantage to our forces which could be gained by equipping our aircraft carriers with high performance strike and fighter aircraft for purely offensive purposes became at once evident. Important naval units and convoys could, when necessary, traverse waters which had previously been thought closed except with special and very expensive cover by land air units. Radar and other radio aids to navigation tended also to the elimination of additional aircrews.

Hence the wide number of rôles now capable of fulfilment by single-seat fighter types of aircraft, and the presence in the Fleet to-day of so many of such types, namely, the Seafire derivatives up to the latest the

Seafire 47, with its 2,000-H.P. Griffon engine and most impressive performance; the Sea Fury, a naval version of the latest Hawker land type fighter; the Sea Hornet whose merits may be deemed to place it in the lead of all present piston engined carrier planes; and the hooked Vampire, whose spectacular speed, climb and high altitude performance are sufficiently well known to need no comment here. All these types are now in service in the Fleet. On the other hand the Firefly two-seaters are still to be found in great numbers in the post-war Fleet and at its training stations, and are likely to remain so for some time to come. Though it is almost a pre-war design of aircraft, following the pre-1940 naval policy that every fleet fighter should carry a second member in its crew, it is still able to fulfil many naval needs, and in certain special duties, as for example night-fighting, has advantages over any single-seat fighter.

Carrier-borne aircraft have scope for operational employment in war which for reasons referred to above were not foreseen before 1940. Technically it is now recognised that carrier operation in fact offers advantages of performance, for certain kinds of mission, not open to land based aircraft. The chief of these advantages is that they can be operated at great distances from a belligerent's territory without the necessity of having to carry as large fuel loads, as numerous crews, or as much weight of navigational and radio equipment, as is demanded by long-range shore-based aircraft. The assisted take-off and arrested landings also allow aircraft of the highest performance to be operated from the carriers' decks, and many opinions hold that it may be possible thereby to operate aircraft which are, both for interceptions and local "strikes," able to out-fly the enemy's striking and defensive aircraft.

Certain other aircraft of war programmes are still under development and service trial. Amongst these is the Firebrand, which started life on the drawing board as a high performance single-engine fighter, but which, owing to diversion of effort and other war-time delays, became *démodé* as a fighter and has now been adapted as a torpedo plane. Next we should mention the Sea Otter replacement, for the present known as the Supermarine S. 14/44, which, owing to the Admiralty's policy in regard to catapult-ship aircraft, is not expected to be embarked except for air-sea-rescue duty in carriers. Last, but not least, are the Helicopters. The Navy is now finding increased usefulness in this type of aircraft for local communications purposes, and we may soon expect to see it afloat for the transport of personnel, mails, despatches and light stores between ships and between ship and shore, its use not of course being confined to aircraft carriers.

FRONT LINE AND TRAINING STRENGTHS.

At the time of writing little information regarding numbers has been released for publication. Certain broad indications are, however, given on the number of front-line squadrons and shore training strengths by relating these to the number of carriers and schools which are being maintained on a peace service basis. It can consequently be estimated that during the present year some fourteen squadrons will be provided for the commissioned carriers, and these will include some 150 to 180 aircraft. The majority of these will consist of single-seat (Seafire) and two-seat (Firefly) fighters, while there will be a smaller number of embarked squadrons of some of the other types discussed above.

Barracuda squadrons have generally been withdrawn from the carriers

and at present they are supplying some of the needs of specialised training ; the most important school at which they are so employed is the Joint Naval and Air Force Anti-Submarine School in Northern Ireland, and for this kind of work they are particularly well suited. Firefly aircraft are also being used extensively for operational training. At the naval school at Lossiemouth, which was transferred to the Navy during 1946, a large number of these aircraft are provided for many different kinds of specialised training, including conversion of new pilots to service-type aircraft, deck-landing training and the air-warfare course. Seafires also are in use at this school.

Hence during the present transitional period Fairey aircraft appear to be taking the lion's share, that firm having contributed very largely to the building up of naval aviation during the expansion and fighting period of the last ten years ; the Fulmar and Swordfish virtually held the ring for naval operations during some of the most anxious and hard pressed periods of the war.

Other aircraft which are playing a part in specialised naval training are :—

Harvard—Refresher, advanced and other pure flying courses.

Oxford—Instrument flying and twin-engine conversion.

Mosquito—Twin-engine conversion, and advanced flying.

Lancaster—Engine handling, and navigation.

Tiger Moth—Short flying courses for young officers of the executive and engineering branches, as a normal part of their naval training.

Sea Otter—Conversion to amphibian flying.

As our carrier force increases, the total of front line aircraft will of course rise to considerably greater figures than the foregoing. It is estimated that not less than twice that number of squadrons may in fact be needed to equip the fleet and light fleet carriers when the naval construction and manning programmes now in view have been completed.

The types of aircraft which will then be in use afloat cannot be accurately forecast, but present tendencies show a continuance of the war-time policy by which strike as well as fighter aircraft dispensed with their observers and their gunners in favour of higher performance. A proportion of both types will no doubt be required, for certain classes of anti-submarine work, special reconnaissance and navigational duties need multi-seaters ; night fighting likewise. On the other hand the increased use of radio aids to navigation are, in fact, making it more rather than less possible for pilot navigation to be used over large distances with a good degree of reliability. The proportion of fighter to strike aircraft, which during the war altered drastically from about 1 to 3 to about 2 to 1, seems likely to remain high, since the number of purposes for which fighter type aircraft are suitable appears still to be increasing. Obviously when twin-engined aircraft are embarked the number in any one carrier is reduced below that for single engine types.

WEAPONS.

The increased use of electronic devices for aiming weapons and controlling the flight of missiles is making significant changes ; so also is the development of rocket-type missiles. These changes seem likely to bring about the disappearance of the charge-fired automatic gun, and normal

sighting. In underwater attack the depth-charge and torpedo still seem likely to survive because of their effectiveness and relative simplicity in operation. The future fate of the bomb is not yet clear. But opinion seems generally to be stiffening against the bomb as a naval weapon even in dive-bombing attack. It is, however, too early for abandoning the bomb, at least in the latter form of attack where the superior accuracy of aim has been repeatedly demonstrated in the war. The importance of photography has grown and this may be expected to govern a proportion of the types of aircraft carried in the balanced fleet.

FUTURE DEVELOPMENTS IN NAVAL AIRCRAFT.

The Navy has already been able to test and accept the jet-propelled aircraft for carrier operation. With this new era in naval aircraft propulsion opened as it was by the Vampire, a further innovation simultaneously demonstrated its acceptance in carriers, namely the use of the tricycle under-carriage. There had previously been great scepticism as to the practicability of landing such aircraft on the deck without accident arising from the height of the arrester wires. This has been successfully overcome and we may expect future designs of naval aircraft to embody this form of under-carriage owing to its great and well known inherent advantages, most of which have at least as much value on a deck as on a runway. Few details are as yet available either of the general design or performance of the aircraft which we may expect to see in carriers during the course of the next three years, but it is known that they will be basically designed to meet naval requirements and for carrier operation.

SHORE ESTABLISHMENTS AND SCHOOLS.

Much criticism of the Navy's policy in this respect has appeared lately, and perhaps the reasons for such a large proportion of personnel and expenditure from the naval vote being devoted to shore establishments are not realised. There are two basically important features in the conduct of naval air work which make big demands for such expensive and relatively unspectacular commitments. The first is the vastly increased complication of material maintenance. Naval aircraft are themselves perhaps four or five times (if one can use a mathematical comparison) as complex in controls and equipment as they were only eight years or so ago. They have also to be more critically adjusted and more scrupulously tested because, with far higher powers and performances than were common in pre-war days, the safety and the total success or failure of an aircraft's operation hang almost entirely upon the accuracy with which each control can be used.

Aircraft therefore spend longer on the ground than formerly was necessary and this entails more space, more storage and, for good maintenance again, more spares both in aircraft and their components.

The second factor demanding increasingly large or numerous shore establishments is training. The more elaborately equipped the aircraft, the longer the training required for its use. Also, the higher the performance, the more sensitive the handling called for and, again, the longer the training. Perhaps one of the most important principles now followed in flying training is that of aiming at something approaching perfection in each step before the next is begun. This is one of the main factors in building confidence and in reducing accidents. Our aircraft are flying

faster, higher and further ; they are flying in all weathers, and operational accuracy of a very high order is demanded—again more training.

The future policy in regard to the flying training of naval pilots is still uncertain. At present the responsibility for the basic flying training of naval pilots rests with the Air Ministry but the Admiralty are understood to hold the view that this should be their own responsibility. The shore establishments and schools now devoted to naval aviation do not therefore include elementary and service type flying training. The existing arrangement is defended by its supporters on the grounds that it secures standardisation on the one hand and economy in overhead expenses on the other.

This seems to assume (a) that standardisation of the basic principles of naval and land operation flying is needed and (b) that it can only economically be achieved in this way. Moreover, the effects on the young man of making this introduction to flying in a Royal Air Force School, with Royal Air Force Instructors, and surrounded by the traditions and discipline of that service cannot very well be discounted. So long as the present policy continues it must be recognised that young naval pilots will inevitably have a tendency to regard those aspects of flying and those features of aircraft appropriate to the Royal Air Force as being the more natural and better than those in which conditions demand a difference for the naval service. That is an inevitable psychological result, and it may in fact, be one which has tended to retard the specialised development of naval aircraft design and air tactics.

When naval pilots leave the elementary and service flying training schools under the Royal Air Force they receive operational flying training under the Navy. This is now carried out at the Naval Air Station at Lossiemouth which last year was taken over from the R.A.F. There they undergo conversion to operational types of aircraft and deck-landing and carrier training. The school is very suitably situated for this since the final deck-landing and carrier training can be carried out direct from this school on board a carrier at sea in the Moray Firth. Pilots are then ready for attachment to service squadrons.

Other specialised schools are the *Instrument Flying School* now at the Royal Naval Air Station, Crail, but which will later move to a new Station in Cornwall, where also will be situated the Advanced Flying School, lately at Hinstock. The latter school is the naval counterpart of the Empire Flying School at Hullavington, and at it are studied all the most recent developments and practice in naval aviation both in ground study and in the air. The students generally include those officers who are due to command squadrons or to be appointed as senior pilots or chief flying and ground instructors at schools. It is supplied with the latest types of naval aircraft and the most up-to-date available equipment for air navigation and radio aids, and for the study of flight theory and propulsion problems.

The *School of Air Warfare* : pilots are sent there to study and qualify as instructors in the more advanced practical aspects of air combat, ground attack, reconnaissance and other forms of naval air tactics.

Night Fighter School, Twin-Engine Conversion and Amphibian Conversion Schools—whose function is self explanatory.

A further school of practical aviation is the Inter-service Anti-Submarine School to which reference has already been made. Other schools of non-pilot training are also situated at naval air stations. These include the Naval Air Signal School, School of Photography, the Central

Recognition School and the School of Air Medicine. In addition to this are training establishments for Naval Airmen, Aircraft Handlers, Fire-fighting, and Air Mechanics, and the apprentice and other schools for Aircraft Artificer training.

This list, though formidable, is not of course exhaustive, but it illustrates the progress which has been made by the Navy since its assumption of administrative responsibility for naval aviation, a task which had hardly begun when the last war was upon us, and whose difficulty was greatly increased by the tenfold expansion of first-line commitments which took place during the war. At the present the size of such establishments is liable to appear excessive in proportion to our front-line peace strength in aircraft, but it must be remembered that the target size of that front-line peace strength has not yet been reached; and moreover, it will not be manned at all unless, to make good demobilisation losses, these relatively large training establishments are worked at capacity for the next few years. When the full peace strength of aircraft and numbers of personnel are reached, the size of these schools and the number of shore bases will not appear disproportionate.

PERSONNEL.

POST-WAR REQUIREMENTS, RECENT CHANGES AND INNOVATIONS.

The work of post-war committees to study naval air requirements of personnel in the light of recent war experience is now beginning to bear fruit. Many vital problems, some connected with changes obviously demanded by technical developments during the war, and some long deferred questions of re-organisation, which were only temporarily adjusted during the war, arising out of the Navy's assumption of control of its own aviation, have been tackled by these committees and among these the following have resulted in some very fundamental changes in policy.

PROVISION OF PILOTS.

It is now decided that the number of officers in each squadron will be fixed so that only about one third of the aircraft will normally be flown by officers. The new rating of naval pilot has been introduced and he will occupy and enjoy a status with no exact counterpart yet in other branches of the Navy. Owing to the particular conditions in which pilots, regardless of rank, have to live, eat, rest and associate together when off duty in the interests of co-ordination and mutual safety, special names have been introduced to denote the new grades, which avoid exact disciplinary comparison with the naval ratings in other branches. Thus we are to have *Probationary Pilots* (under training up to the "wings" qualification); *Pilot IV* (while undergoing training); *Pilot III* (when qualified for full flying duty) generally equivalent to Leading Rate; *Pilot II* corresponding to Petty Officer; and *Pilot I* to Chief Petty Officer.

Naval pilots will all wear "fore and aft rig" and will normally be entered direct from civil life to this branch of the Navy. On the other hand ratings from other branches can, if fit and suitable, transfer, in which event they will permanently join the new branch. Royal Marines and Aircraft Artificers, however, who the Admiralty consider can very usefully revert after a period of flying to their former duties, will retain their identity and status in those branches, and for them being a pilot will become a non-

substantive qualification. The full details of this scheme have recently been published in Admiralty Fleet Orders.

OBSERVERS.

This branch of specialisation is to die out. In future all pilots are to be trained in those aspects of aviation hitherto carried out mainly by observers, and in fact in all the branches of airmanship, navigation and communication now required by flying personnel. In practice this change has, for some time past, been introducing itself, since during the war so many of the duties formerly assigned to observers had perforce to be done by pilots in addition to the latter's normal flying, owing to so many of the aircraft employed on all kinds of missions being single-seaters. From a training (and also the pilot's) point of view, the additional burden of work and responsibility is not so serious as it might at first appear to be, for two reasons. The first is that there was in the past a very considerable overlap—pilots normally learned a good deal of navigation, signals, bombing, air gunnery, spotting and many other observers' arts. Observers likewise had to study a good deal of what was the pilot's duty, in general airmanship, tactical handling and so on. The second cause is that much of the "back seat" work has become simplified, for example, radio operation is now far simpler, mainly due to R/T having largely taken the place of W/T, and to the introduction of press-button or other forms of pre-selected tuning of sets.

On the whole the change is a welcome one and carries with it little ground for speculation or anxiety as to its justification. It is long overdue, as it greatly simplifies training and administration, and increases the flexibility of the organisation. A very good illustration of this may be seen in the situation which arose early in the war, after the rapid and widespread introduction of Hurricanes and Seafires and American naval types into the Navy. There became a great surplus of observers, who, had they been trained as in the United States and other Navies on one standard of general aviation duty, could have been used to fill the badly needed ranks of pilot. The scheme is also welcome to many observers, as it is now giving them the chance of qualifying in flying, instead of merely being the onlooker.

AIRCREWMAN.

Flying personnel not qualified as pilot are now all brought together under a single new category called "aircrewman." This change has been made because of the altered requirements for present day aircraft. The observer and observer's mate are eliminated because they have become an unjustifiable luxury. The high-performance aircraft now demanded are necessarily compact, and can afford neither the space nor the weight for any personnel whose duties could, by taking advantage of modern equipment, be carried out by the pilot. On the other hand, some new equipment (e.g. Radar) and certain types of armament and navigation instruments, not carried before the last war cannot always be operated by the pilot, and in these circumstances aircraft will sometimes need an aircrewman whose main duty is the operation of various types of electrical and electronic equipment. When occasion demands he can act as gunner, bomb aimer, etc. By reason of the general nature of these duties, and because some economy in personnel can also reasonably be achieved by making this rating responsible for daily maintenance of his equipment, it

has been decided that aircrewmembers shall be recruited from the new Electrical Branch of the Navy. Thus there will be :

- (i) *Aircrewman IV and III* who will hold the qualification while in the rate of Leading Electrical Mate (A.B) and can revert to electrical duties after a period of duty.
- (ii) *Aircrewman II* (Petty Officer) and *I* (Chief Petty Officer) will be taken from those who do *not* revert but elect to continue in the branch of Aircrewman.

These ratings will wear T.A.G's. "wings," except the Chief Petty Officer who will wear observer's.

NAVAL AIRMEN.

This branch, which was instituted immediately before the war when the Navy took over the F.A.A. from the Air Force, has now been extended to embrace all the semi-skilled ratings required for naval aviation generally, including Air Mechanics. Naval Airmen are thus the counterpart of the Seaman and the Stoker, and appropriately form the third great branch of the Navy's manpower. Safety Equipment workers, Aircraft Handlers (which category also covers Air Traffic Control ratings) Meteorological Observers and Photographers together with Air Mechanics (semi-skilled) and Ordnance Mechanics form the different sections of this branch.

Skilled Air Mechanics are the higher rates (Leading Airmen, P.O., and Chief Airman).

The *Air Mechanics* can be described as "servicing" ratings, and do not specialise, but leading rates who become *Skilled Air Mechanics III* specialise as Rigger, Fitter or Armourer. P.O. and Chief Airmen are S.A.M.I.

Following the practice of the Engineering Branch of the Navy, Air Mechanics (as with Stokers) can qualify for *Air Mechanician* when Leading Airmen S.A.M.I., and they become graded as *Air Mechanician 2nd Class, 1st Class* and *Chief Air Mechanician*.

Aircraft Artificers. These are the higher skilled ratings and their careers are, as formerly, exactly analogous to the other Artificer branches of the Navy. An innovation here, however, has now been made. When, at the beginning of the war, this branch came into being, it had two separate categories, the A/E (Airframe Engine) Air Artificers (as they were called), and L/O (Electrical Ordnance). Admiralty policy is now to avoid duplication in any form, and by virtue of the introduction of air courses and qualifications for Ordnance Artificers and Electrical Artificers the A.A. (L/O) has become redundant and the Aircraft Artificers are now all similarly qualified, viz : for engine and airframe duty alone.

The above measures seem to be a consistent step towards the Admiralty's avowed object of ensuring the assimilation of duty with aircraft into the general life and organisation of the Navy, and so avoid a "private empire" for the air. Moreover their aim is also to simplify the highly complicated organisation (really a patchwork) which had been built up by a hand-to-mouth process during the war. The total number of different categories has been considerably reduced and the tendency to "over-grade" men with no great claim to the higher rates should now be successfully checked.

In general there is a tendency to give more responsibility in aviation to

men of the lower deck. The "rating pilot" scheme is drastic and will no doubt meet with many opponents. Perhaps experience will show that the responsibility and degree of skill demanded of the modern aircraft's "captain" justifies officer status. One cannot, however, but feel that this step is entirely in keeping with both the progress and the needs of the present age, no less than being a very reasonable and justifiable effort to preserve the status of "officer" for those who command and direct a number of subordinate individuals. Officer pilots are to be reserved for the positions of squadron and flight commander, and administrative posts demanding an officer's experience and greater knowledge, except for a few billets to be held for relatively short periods, by officers gaining their first experience in first-line units.

RECRUITMENT OF OFFICERS FOR PILOT DUTY.

With the greatly increased importance of aviation in the Navy of to-day the number of officer pilots is of course much larger than before the war. The Admiralty has now returned to its former pre-war policy that all such officers shall normally belong to the executive branch, and that flying shall be a specialisation similar to gunnery, navigation, signals, etc. To meet the immediate needs of the branch, however, many of the R.N.V.R.(A.) pilots have been required to serve for several more years and the four years' "Extended Service" scheme came into being: those officers remaining, becoming R.N.(A.) with temporary commissions. There are also still a number of the original officers of the R.N.(A.) branch who joined before the war for seven and fifteen years' service in the Navy. It is not yet known how many officers of these two categories will be needed to extend their service still further in future, but it seems highly probable, on the face of it, that the numbers will have to be fairly large, owing to the relatively small number of executive officer pilots remaining at the end of the war. There will also be a serious gap in the lists of officers of some seniority with flying experience for filling the more senior appointments for some years to come, unless full use is made of these groups, and the much needed continuity as well as the most valued of all kinds of experience, that of active service in war, will be lost. Consequently it is sincerely to be hoped, for the sake of the Navy's future, that a good proportion of the present R.N.(A.) officers will eventually be given permanent commissions in the executive branch.

Soon naval pilots will be entering under the new scheme and will begin their training; and from these as well as from other rating pilots who will be trained with them—those entered under wartime schemes whose training was discontinued at the Japanese surrender—a fair proportion of officers will be selected.

RESERVES.

Whatever is the outcome of international negotiations for disarmament it is evident that the war strength of the British Navy, and in particular its air strength, will in future have to depend very largely upon a well trained Reserve. Economically this principle is almost inevitable in regard to the provision of air material in peace. Aircraft are undergoing now, and will probably for many years to come, relatively rapid evolution in design, performance and methods of utilisation in war. To keep large quantities of ready-made material in being in peace is most wasteful; the majority of it is unlikely to be up-to-date at any given moment, and the amount of

money, labour, and space expended on its maintenance in peace is most uneconomical. The rapid expansion of facilities for production when emergency demands is now recognised as more feasible and practical and it is generally considered that arrangements should be made to this end, rather than that large stocks of manufactured materials should be kept in storage.

With a Fleet, the requirements are not quite so simple as for land-operated air forces. Aircraft carriers cannot be built quickly, and moreover, the Navy's forces have to be deployed across the oceans at the very commencement of war. Hence it is vital to have a carrier reserve in being, and with it a highly efficient reserve of air units ready to embark soon after mobilisation. This force is not of course comparable in size to the main flow of reinforcements in aircraft and personnel which all air fighting organisations need soon after the outbreak of war, to replace casualties and expand to meet the strategical commitments as they arise. Its importance consists in its state of readiness and efficiency.

To meet this the Navy has begun to provide itself with Volunteer Reserve Air Squadrons. Approval has been given for four, in the first instance, as was announced in the Navy Estimates of this year, to be based one each at the R.N. Air Stations of Stretton, for the Liverpool area, Culham for the London and Oxford area, Abbotsinch for the south Scottish area and at one other place—possibly, it is believed, Bramcote—for the Midlands. It is understood that their formation will soon be followed by others on a scheme which will provide for the equipment of all the carriers which go into effective reserve. This scheme takes advantage of the very large numbers of officers and men who have already been trained and had operational experience in carriers. Not only will these units now be almost entirely manned by those who are seasoned by recent active service, which must greatly add to the speed with which they can take over new operational duties should the emergency arise; but as time passes and younger men join the reserve, there will be an assured stock from which to draw the leaders for many years to come, and in the meantime the new recruits will have been in direct association with war experienced men.

It is also understood that it is the intention that an effective contact between this reserve and the active Navy shall be maintained in two ways; the Reserve squadrons will have officer instructors and staid hands attached to them from the Service, to help in training and supervision of maintenance; and from time to time the Reserve units will be embarked in carriers, or attached to the active training establishments ashore, for their annual periods of training.

It is expected that the general effect of National Service will be favourable to the building up of this reserve; it should allow those intending to join the Volunteer Reserve in any capacity, to complete a large part of their training as National Service recruits, and so reduce the long period which would otherwise elapse before their evening and week-end drills and training could succeed in giving them necessary qualification for undertaking full squadron duties.

LOCATION OF RESERVE AIR UNIT BASES.

The neighbourhood of a naval port is not ordinarily a good area for recruitment to the R.N.V.R. Such areas are already well filled with serving or pensioned naval personnel, and by tradition their sons seem either to join the service or be unattracted by any kind of naval service.

The most promising areas are more inland near the big industrial or university cities and in places where communications would allow reservists to get easily from their work and homes to the chosen airfield or training centre after normal working hours. Unfortunately there are very few naval air stations so conveniently situated as to provide facilities in such areas, but those now chosen for the first four R.N.V.R. squadrons are amongst this number. Even so they are not all as near the homes of recruits as one would like to see. It is to be hoped that in the best recruiting areas where no naval air stations are situated other arrangements will be made, such as co-operation between civilian authorities at municipal airports, or the aircraft industry, and the naval reserve command, for the establishment of units at non-Service airfields, as was done in the case of the Royal Air Force Volunteer Reserve before the last war, with great success. The Royal Navy would do well to study the organisation and methods of the Air Force Auxiliary Squadrons in their pre-war training. The morale and efficiency of these units could hardly be exaggerated, and how better could that have been proved than by the war performance of those squadrons on active service all over the world.

THE FUTURE.

Nothing has happened during the last war which in anyway diminishes the fact that the survival of England in war depends as ever upon her ability to maintain her sea communications and sea-borne trade across the oceans. It is the main function of the Navy to protect these sea routes in war; it is a secondary but important function of the Navy to support military operations, both in attack and defence, when such operations require the use of shipping or ship-borne weapons. In fact all forms of sea warfare are the Navy's concern. The use of air weapons and air reconnaissance in maritime operations was developed so rapidly during the last war that a very large proportion of all the problems of naval warfare are now concerned with the use of aircraft. Developments now in progress may well lead to an increase in this proportion, until the majority of naval personnel have duties more or less directly connected with the operation of aircraft or airborne weapons at sea. The future of naval aviation and the future of the Navy may well be synonymous.

Without attempting to indulge in vague speculation on the details of material developments which might affect strategy on the larger scale, one's conclusions on the future of sea warfare are bound to be governed largely by the lessons of recent operations and naval strategy. The majority of considered opinion recently expressed on the broadest aspects of strategy in relation to the possible use of the new weapons, the long-range rocket and the atomic missile, appears to reach but one conclusion. These weapons, apart from their more promiscuous use against non-military targets, and their more devastating effect upon the unprotected, are no different from all the other weapons formerly used by man, in that the advantage in their employment lies with the combatant who can most easily control movement on land and sea by his own military and naval forces. No missile can, in fact, originate in the air, it needs a land site or a ship from which to proceed upon its lethal journey, and this very fact is the basic and unalterable law of strategy. Should the development of these weapons culminate in their mass production in peace on a great scale, then it might clearly be possible for a country to strike unexpectedly

one day without a declaration of war, and, if sufficiently perverted, without even any visible pretext which could have provided any warning to its victim. Does not humanity, fearing this possibility, now most earnestly hope for an all embracing international insurance against such a thing ?

All the available knowledge of the present time goes to show that the appearance of these weapons can and will be followed, as all other weapons have in the past, by counter-measures, which will offer a large degree of protection to naval and military forces from their effect. It is only the unprotected civilian populations and non-military accommodation and materials for which protection can hardly be provided on an adequate or practical scale in peace. But supposing that no agreement against the peace-time massing of these weapons can be reached, and evidence comes to light that such an armament plan is being begun, then a state of war, possibly universal, will anticipate not the blow, but the preparation. The normal course of strategical operations will be set on foot to isolate the planning power by military and naval forces. Unless he also possesses such forces in superior numbers he will not be able to gain his advantage by use of the new weapons.

In the field of more immediate practical consideration, the facts of the last war force one's attention upon the questions of organisation and command. Ever since the first appearance of aircraft in warfare, this has proved a difficult and contentious question. The last war may however help us to discern now more clearly the best lines for future application. Probably this war's most remarkable feature was that of the speed with which large forces were moved and the relatively enormous scale on which they were provided for all major operations. Not only were vast forces moved over considerable distances, faster than ever before in history, but all of the other features of warfare were greatly scaled up ; the units themselves had a far higher tactical speed, from light mechanised infantry units and self-propelled guns to parachute divisions, and from long-range strike aircraft to submarines ; the shadowing of forces at sea by night could be carried out by radar-equipped aircraft at 20 to 30 miles ; reconnaissance reports could be flashed out and interpreted in a matter of moments.

Such developments called, more than at any previous time, for the closest possible co-ordination of thought and action between the several parts of every organisation engaged in the operations.

It may not be unprofitable to consider whether this co-ordination was always available in the required degree, and whether the organisation which existed was calculated to provide it in the best way. In the Battle of the Atlantic, which, as our great war Prime Minister often declared, provided the gravest anxiety of all campaigns of the war, our convoys were constantly harassed by enemy submarines and aircraft, and occasionally by his surface ships. Can we honestly claim that the existing arrangements for studying this measure, for developing and training all the component forces required to combat it, and for the day to day and hour to hour control of them, were a good example of logical and unhampered co-ordination ? Might it not have been better for us had the Admiralty been allotted the full responsibility for organising and providing the sea and air units which inevitably had to act in conjunction from the first to the last minute of the war in the Atlantic ? Would not their subsequent co-ordination at each and every moment have been better achieved if the personnel of these forces had formed part of the same service, and been trained and subsequently commanded at all levels as one service ?

One might observe that fortunately for us the German Navy suffered under a similar handicap to an even greater degree than ours, namely, that it did not even have a part of its air forces which could have been embarked in carriers under naval administration and control. Had the organisation of the German Navy been comparable in this respect to that of the Japanese Navy, our task in the Atlantic would probably—as has recently been declared by several German naval officers of high rank—have been immeasurably greater, and our chances of survival correspondingly smaller. By a remarkable and most fortunate circumstance the Japanese, after their first amazing successes in sea-borne attack and advance, were not able to reap the full benefit of superiority in this particular respect since their principal opponent, the United States Navy, had grown up and developed its air equipment and command techniques under a similar organisation.

Turning here to military operations, this lesson may there also be confirmed, but in the German case it was more favourable to them. All the evidence goes to show that the German Army, being the senior fighting service, had secured a sufficient control over the technical and operational development of air support to ensure the provision of its tactical needs. In this respect again our pre-war organisation appears to have been at fault. The final conclusion one seems forced to reach is that the division of our forces *materially*, namely, into ships, aircraft, and land equipment, was wrong, and that they should have been divided *operationally* into sea warfare forces and land warfare forces. The last word, however, on this subject may be provided by material developments themselves through the tendency for the aircraft to develop into a controlled missile.

These considerations, though necessarily inexact and vague, point to the need for a fuller study of the problems of training, communications and command. As the material becomes more complicated there must be an increasing elimination of administrative obstacles; as the tempo of war continues to increase (as exemplified by the progress of events during an air strike interception) obstacles to simplified and direct command must be removed. Some voices are even now occasionally raised to advocate a return to the organisation whereby carrier-borne aircraft were a part of the Royal Air Force. Yet on no conceivable ground would it be supposed that this would increase the efficiency of, say, a convoy's carrier-borne escort, or the striking and fighter units operating with a large naval force at sea. The reverse, would in fact appear more logical, namely, an amalgamation between the Navy, and all that part of the shore-based Air Force whose training and equipment was intended for maritime operations.

The criterion for organising, training and controlling any fighting force is the *service* on which it will mainly be employed rather than the *type of equipment* it will use, (which after all is constantly changing). The gun and the radio may be used by all sorts of different services in many different ways bearing no strategical or tactical relation to each other whatever; no one service can claim a vested right to organise, train and control the war work of all gunners or W/T operators. Aircraft are but similar implements of warfare of value to soldier and sailor alike. The organisation and systems of command in each of the Services and in naval and military operations would seem capable of greater simplification and efficiency if the rules for the use of gun and radio were applied also to the use of aircraft.

“VOLAGE.”

CHAPTER VII.

THE OPERATIONAL FUTURE OF THE FLYING BOAT.

Among the most useful kinds of aircraft in the war of 1939-45 was the flying boat. It was employed at one time or another for an immense variety of duties and it played throughout a part of much greater importance than most published records suggest. It worked hard on the lines of communication; it conducted anti-submarine patrols; it helped in evacuations, it conveyed statesmen from one allied country to another; it rescued shipwrecked men; and on occasion it even engaged in aerial battle.

It is the more remarkable that this kind of aircraft has suffered an eclipse. The whole story of the war years would make it appear that Great Britain, above all countries, must develop the flying boat to the fullest extent because she can obtain most value from it. Geographically, strategically, and traditionally one would have supposed that the flying boat would be a primary interest. It is in the line of the surface vessel, a form of craft in which England has concentrated her genius, and it is a type of machine in the design of which British constructors have proved themselves especially expert. Yet the fact is that flying-boat development has been relegated to a secondary place. The main effort has been devoted to landplanes. The chief plans are for new landplanes; the great new air liner visualised by the Brabazon Committee and now in process of construction in prototype form at Bristol is a landplane; the Royal Air Force specifications are for landplanes.

Only here and there can there be found a sustained interest in the flying boat. Fortunately, however, among the few companies which are still trying to make progress with this kind of machine is one which has recently produced a design of unusual interest. It is a flying-boat fighter, of small size and high performance, driven by twin jets.

If that aircraft succeeds it may do much to redress the situation. For there can be little doubt that one of the principal reasons for the loss of interest in flying boats is the suspicion that they cannot compete with landplanes in performance and, above all, that they will not be able to compete with landplanes fitted with turbojets. There seems at first sight something slightly incongruous about a flying boat being driven by turbojets. Yet the new flying-boat fighter shows that the turbojet fits into a flying-boat hull as well as into a landplane fuselage and perhaps better. If it proves that high performance can go with the flying-boat formula it will have done a great service.

At the same time it is universally recognised that it is in the large aircraft rather than in the small high-performance machines that the flying boat should show to advantage. Here there is even less excuse for the neglect of these machines. In the extremely large sizes the flying boat has so many advantages over the best landplane that it is hard to see why this country should have decided to make her first big experiment in really large aircraft with a landplane rather than with a flying boat.

The position at the present moment, therefore, is that the flying boat is being neglected in Britain, but that there are isolated instances of efforts to give it a fresh start. One of these instances is concerned with the small,

high-performance jet-driven type of machine, the other with the extremely large machine. The case for the flying boat is not yet, therefore, lost. But unless there is a reorientation in thought, both civil and military, there is not much chance of the flying boat again occupying a position as important among the country's aircraft as it occupied before the war. Let the operational position be examined on the widest possible basis and let the question be asked whether the flying boat is still worthy of development as a primary operational type in the country's defence services.

I use the term "defence services" because the use of any other term immediately leads to those arguments about the division of responsibility between the Royal Air Force and the Royal Navy that have been so troublesome in the past. In the war of 1939-45 the Royal Air Force was concerned with the operation of flying boats, an arrangement which appeared at first sight and which still appears to many to be an anomaly, even though the Admiralty took operational responsibility. Since then the White Paper on the organisation of defence and the formation of a Ministry of Defence have somewhat altered the situation. The flying boat has perhaps, a slightly better chance of having its case heard impartially than before.

When seeking to assess the merits of the flying boat as a unit of defence equipment the first question that must be asked concerns the kind of war that is visualised. And here the difficulty is the same as for all other articles of equipment. In operations considered as part of a major war, the value of the flying boat might not be high. If, at the other end of the scale, operations are considered as part of a comparatively minor law-enforcement action, the value of the flying boat would be extremely high. The best way to emphasise this is to study the fundamental features of the flying boat and to note where it differs from the landplane.

It was once said that the seaplane is an aeroplane with floats and the flying boat a ship with wings. In that broad definition the whole of the merit of the flying boat can be found. It is to some extent a surface vessel and by appropriate modification it has been given the power of flight. The look of a flying boat underlines its relationship to the surface vessel. It therefore shares with the surface vessel the advantage that its ports of call are ready laid for it by nature. The flying boat can operate where there is sheltered water and it will find "runways" of a standard pattern wherever it may be.

This advantage has always been noticeable; but it is of growing importance as the landplane becomes more sensitive to runways and runway surfaces. Some of the big new landplanes demand not only enormously long runways, but runways capable of carrying heavy loads. These big aircraft are, in fact, bound to a comparatively small number of aerodromes in the world. And it is not likely that the world will ever be provided with aerodromes in all parts capable of taking the extremely large landplanes that are now being built or are contemplated. They will always be, therefore, aircraft with a strictly limited region of operation. But there is no such restriction on the large flying boat. On the contrary, to some extent it is true to say that the larger the flying boat, the greater its area of operations, for the less sensitive it becomes to the amount of shelter that can be provided.

Here, then, is to be seen at once the first affinity between the flying boat and the ship-of-war. It is a form of craft that can operate almost anywhere in the world. It is not bound to certain special areas and it is not

ultra-sensitive to the local conditions. But there is another thing. It is not contemplated that the largest landplane built or building should be capable of housing its crew for any length of time. In other words, no landplane contains living quarters of any kind. There are often facilities for serving meals of a rudimentary sort ; there are sometimes bunks for rest. But there is nothing that can be likened to living-quarters in the true sense. The large flying boat does provide living-quarters, and the larger flying boats that ought to be built in the future could provide comfortable and fairly extensive living-quarters.

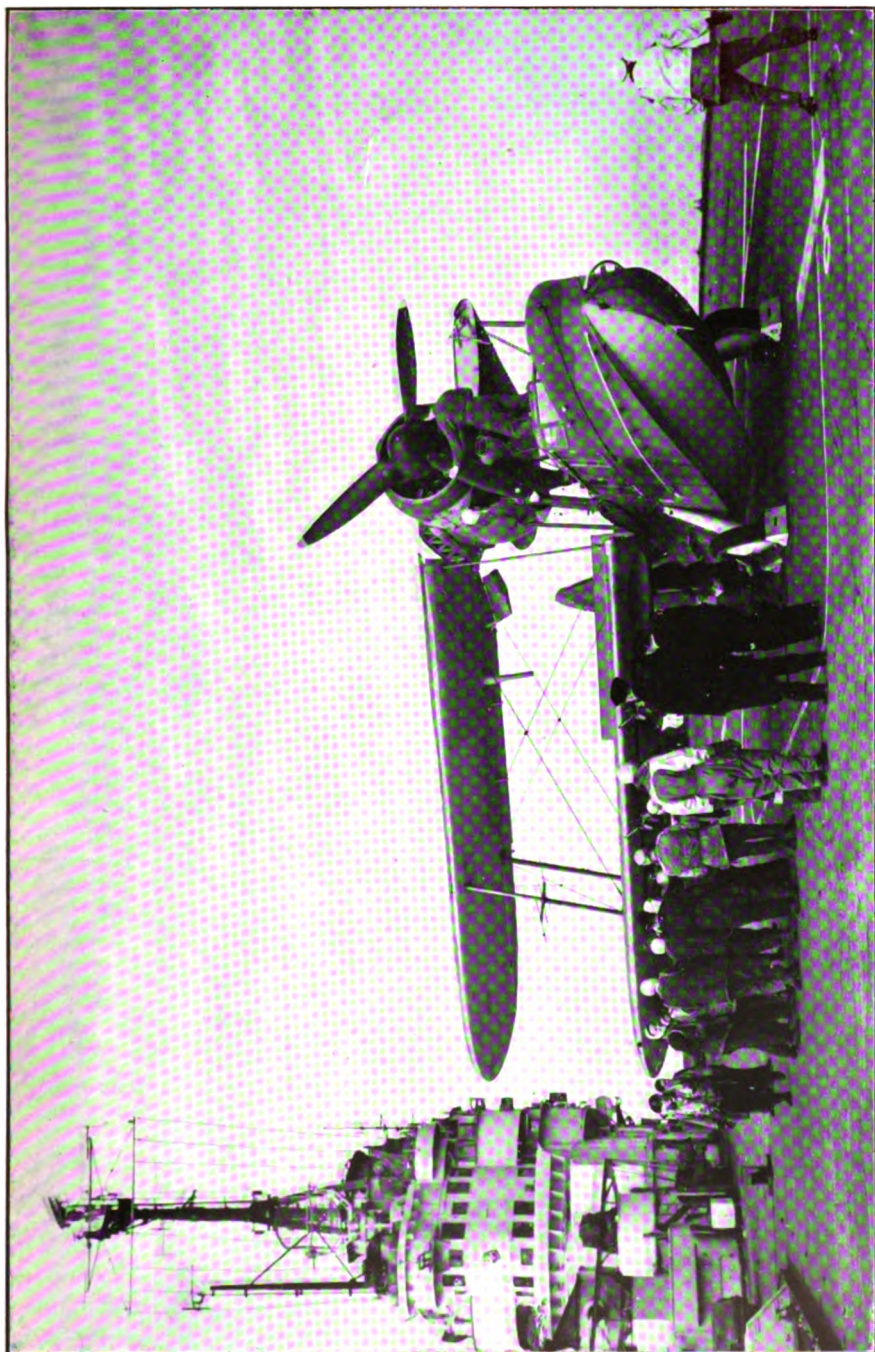
It follows, therefore, that the flying boat could to some extent be a self-contained unit in a way that would never be possible for the landplane. The crew could live on board and could in that manner be assured of reasonable living conditions wherever they were. Such an advantage might be of much operational importance. It is to be recalled that the aircraft carrier has proved of value largely because it combines two things : a self-contained, mobile base and a striking or defensive force. The carrier can take up a position at some point and stay there, a thing which no landplane can properly do. For the landplane is never complete in itself : it is linked to its chain of suitable aerodromes. It is not free to operate where it wishes in the air because of that linkage. Range can never be a substitute for the power of stopping in one place and providing at that place a self-contained unit.

The carrier, being mobile, is able to work in full partnership with its aircraft ; whereas the landplane has in the aerodrome at most a sleeping partner. The land aerodrome cannot do anything to aid its aircraft in the matter of decreasing the distance they must fly to an operational area. But the carrier can do that. Like the fireman's ladder, the carrier gets the nozzle of the hose nearer to the heart of the fire. The carrier aircraft does not have to stagger off from a point far distant and waste pay-load (or bomb load) on fuel, because it takes off near its point of destination.

It is not an exaggeration or in any sense a distortion of the facts to say that the large flying boat might in many ways become a successor to the aircraft carrier and in the direct line of the aircraft carrier. It could become, if it were developed with the zeal that landplanes are being developed, a mobile, self-contained base. The conditions in which such a machine might operate successfully were provided in parts of the Pacific area. In fact, it was largely a study of the Pacific war that led to the design of the flying-boat fighter already referred to. Fighters working in that area had great trouble in finding and keeping bases near enough to the battle-grounds. The flying-boat fighter would have had less difficulty.

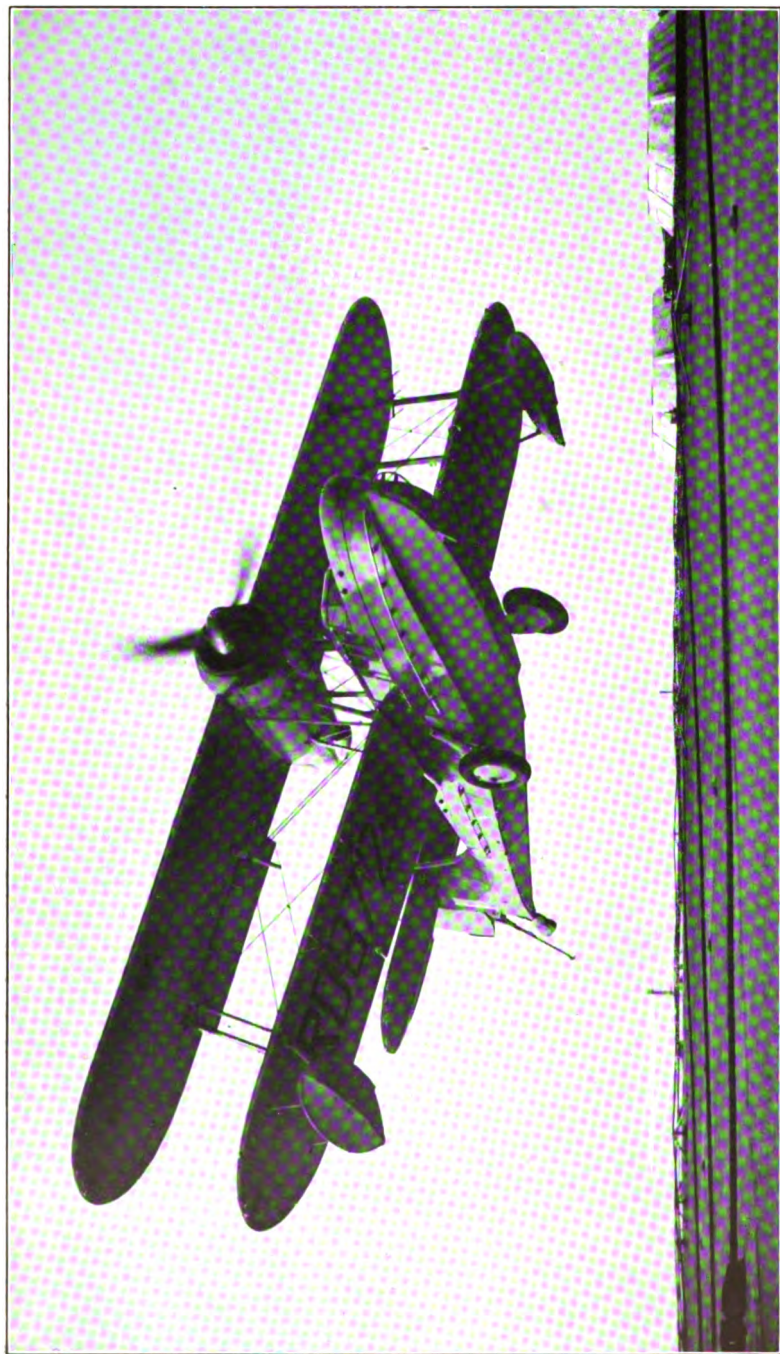
There is, however, a serious weakness to the large flying boat so far as it is possible to judge at present. If it be assumed that it must operate where enemy air forces could reach, it might be excessively vulnerable. The fact that a really high-performance flying-boat fighter may be possible would alter the situation ; but if there were no such fighter the large flying boat would hardly be able to protect itself sufficiently well.

Since the beginning of war flying, there has been a dispute about the relative fighting powers of the large machine with many gun turrets and many guns and the small machine which is of higher performance but probably carries only one group of guns and those all trained to fire in the same direction, that is, directly forward in the line of flight. But although the point has given rise to many and lengthy arguments, the facts of air war are that the large machine with many guns has always proved vulner-



Sea Otter Amphibian, Folding for Striking Down.

Courtesy of Messrs. Vickers-Armstrong.)



Sea Otter Amphibian, landing on.

(Courtesy of Messrs. Vickers-Armstrong.)

able to the small, higher performance machine with few guns. The traditional fighter and the machine that has always proved the master in aerial battle is the small machine, highly manœuvrable, with great powers of climb and speed, armed with a gun group fixed to fire forwards in the line of flight. There was nothing in the war of 1939-45 to suggest that any alteration in the relative fighting powers of the big and the small machine will take place.

Consequently it must be accepted that the large flying boat would be highly vulnerable if it were attacked by small, highly manœuvrable fighters. But it was also abundantly proved during the war that a great many transport machines which are highly vulnerable to enemy air action must be risked near the operational areas. They were given protection as much as possible, but sometimes they had to be left to look after themselves as well as they could and sometimes they were lost. The large flying boat might be highly vulnerable if it were left to itself. But it must again be emphasised that it would go with, or be complementary to, the flying-boat fighter or with some kind of fighter which it would take with it.

There is nothing visionary or difficult about a large flying boat acting as an aircraft carrier. Many different aeroplanes have launched fighters at one time or another. The large flying boat could carry a complement of fighters which it could launch by releasing in the air or by catapult when it was at rest on the water. I am here speaking, of course, of flying boats a good deal bigger than any yet produced. But there is no sort of reason to suppose that there is any bar to great increases in flying-boat size. Nor is there any reason to suppose that large flying boats could not carry a reasonable complement of small, highly manœuvrable, high-performance fighters.

The composite aircraft has appeared in various forms and been tried in various forms. It has proved beyond any manner of doubt that the technical problems of attaching a smaller machine to a larger, of taking off with the two thus connected together, and then of separating in full flight have been solved. Britain did this trick first during the 1914-18 war, when a large flying boat took off with a small biplane fighter attached to the top plane and released the fighter when in the air. Britain again did the trick, though in more elaborate and more carefully studied form, between the wars with the Short-Mayo composite aircraft, which subsequently set an international long-distance seaplane record. Germany did the trick with various combinations of aircraft. In brief, the difficulties are known and the means of overcoming them have been devised. It follows that the carriage by a large flying boat of a small fighter escort—one machine or two—is a simple matter. It might provide the means for giving the flying boat that protection that it needs if it is to approach closely to battle areas.

The purpose of this article is to put forward some of the claims of the flying boat to be considered among the essential aerial equipment of our defence forces. But something can be learned from the use of the flying boat on the commercial services. Here Britain pioneered this type of machine with outstanding success. Imperial Airways, Ltd., under the managing directorship of Mr. G. Woods Humphery, adopted a policy of flying-boat services on the long-range Empire routes. And in pursuance of this policy a number of what were then known as the "Empire" class flying boats was ordered from Short Brothers, the constructors of Rochester. These Empire boats were not only the most successful commercial aircraft

ever produced in Britain, they were, as foreign observers are the first to admit, the most successful commercial aircraft ever produced anywhere. They established remarkable records of service and security, and as has been indicated they gave rise to aircraft which proved of the utmost value to the country during the war.

The ordering of these flying boats was a bold stroke, for a small fleet was ordered straight off the drawing-board. That was one reason that in these boats Britain acquired a lead over the rest of the world. The normally lengthy prototype testing was short-circuited. Some say that it was merely good fortune that permitted that period to be short-circuited without disaster; others say that we do in this country know something about flying-boat design and can build a flying boat to a new specification with a reasonable chance that it will not be subjected to any very severe "teething" troubles.

If it were possible to-day to take a similar line and to find one of the air-line corporations ready to take a like risk—with a like experienced judgment—we might again acquire a similar lead. For new flying-boat designs have been got out. The same company, Short Brothers, has built the Shetland, which during trials proved itself to be a remarkably efficient machine and to have all the qualities claimed for it. But for some as yet unexplained reason no large order for flying boats was placed. Nor has any order been placed at the time of writing with any other of the companies that have experience in the building of this kind of aircraft.

One more point drawn from commercial experience must be noted. There is a widespread preference among the long-distance air-line passengers for the flying boat over the landplane and there is a widespread impression that the flying boat is fundamentally safer than the landplane. Statistics on this subject are hard to get. But the view that the flying boat is safer than the comparable landplane is one that is shared by many pilots of long experience and extended knowledge. The fact that the taking off and the landing surface for the flying boat, though subject to surface irregularities of unpredictable amount, is always nearly level and always of the same weight-bearing properties may have something to do with it. There is also the fact that where there is shelter, the length of the flying boat's runway is unrestricted. For this kind of machine it is not necessary to raze villages to the ground, to cut down woods, and to pour thousands of tons of concrete on to the earth. It is not necessary to prepare to spend £5,000,000 on a base for flying boats. A flying-boat base is an expensive thing; but it can never approach the cost of a comparable landplane base, with its immense and elaborate network of runways, parking aprons, loading areas, and taxi-tracks.

Objection is sometimes taken to the flying boat on the grounds that it requires too elaborate an apparatus at the ports of call for the handling of the machine on the water, for its mooring, and for the embarkation and disembarkation of passengers and freight. There used to be some truth in the contention that a large staff and a good deal of equipment in the way of motor boats, and the rest of it, were needed for the handling of flying boats. But that was because this problem had never received individual study. It has now received individual study, and an automatic mooring system for flying boats has been devised which can, if required, not only pick them up when they have taxied near to a pre-determined point, but also bring them to a specially constructed loading and unloading bay.

A good deal of attention has been directed at the small, twin-jet flying-

boat design. But that was largely to indicate that there is nothing inherently impossible in providing a small flying boat with a high performance or in fitting it with the latest kinds of power unit. But the main case for the flying boat, whether for civil or for military purposes, rests on the large machine. It is in the large machine that the flying boat shows a net advantage over every other kind of aircraft.

Nor is it easy to see why this country, with its lead in these machines, should have so neglected them recently. It may be, as some suggest, that those in authority were mesmerised by the fine achievements of the American aircraft industry in the design and construction of landplanes and that they felt that the only course for Britain was to trail along behind, as we have been doing, in poor imitation of the American aircraft. Or it may have been that the Royal Air Force has felt itself largely wedded to the land from the beginning and is reluctant to turn full attention to a kind of machine in which the Admiralty had so much interest during the war, while the other defence departments were not in a position to sponsor the large orders that would be required for a sound flying-boat development programme.

However it was, there are signs at last that the fault has been recognised and that attempts are to be made to rectify it. Some moderate encouragement is being given to the construction of large civil flying boats. But much more encouragement is wanted. And, above all, the operational flying boat or the flying boat designed for naval and military purposes requires urgent treatment. The Air Ministry does not show any signs of being interested. It is an astonishing thing that in a Commonwealth founded on sea power there should be nobody ready to sponsor the development of the kind of air transport machine which is most closely linked to sea power. It is even more astonishing that the United States Navy should be devoting more attention than any service department in this country to the development of the large-size flying boat. It would indeed be tragic if, after trailing behind the Americans in an attempt to imitate their landplanes, we were to find ourselves in the position of having to trail behind them in the imitation of their newer flying boats.

The flying boat has much need for a few champions in high places. Its case for consideration is complete, yet does not appear to be noticed. We shall be throwing away what almost amounts to a traditional skill unless we turn again to the flying boat and devote a large part of our aeronautical effort to its development.

OLIVER STEWART.

CHAPTER VIII.

THE DEFENCE OF AUSTRALIA.

FROM the point of view of the Australian people the end of the war produced two outstanding convictions : the removal of the Japanese menace ; a new threat from atomic warfare. The first was accompanied by a feeling of intense relief ; the second has brought a feeling of uncertainty and anxiety. From the earliest days the Australian people have always been conscious of their isolation and of the threat from the north. In the very early days of the settlers and first colonists, at the end of the eighteenth and the beginning of the nineteenth centuries, the foundations of national prosperity were being laid chiefly by the growing and rapid increase in the wool industry. A large continent, 3,000,000 square miles in extent, was slowly but surely occupied by a sparse and minute population, which in its search for new grazing pastures pushed ever further into the interior. This great land mass, far removed from the outside world, apparently lay at the mercy of any invader strong enough to transport an expeditionary force overseas and to land and seize the territories at any point it might choose.

Apparently, but only apparently. The colonists were left in peace to develop their great new country not because there were no envious powers able and willing to step in and to take possession, but because of the presence of an invisible shield. That shield was the Royal Navy.

The first colonists had landed in Sydney in 1788, a year which thus marked the foundation of Australia. In 1830 there were still only 50,000 males in the whole of the continent ; in 1870 there were still less than one million ; even in 1900, when Australia came of age and the Commonwealth came into existence, marking the end of the old " Colonial " period, there were less than two million males distributed throughout the entire continent.

It is obvious that throughout the whole of this period of 112 years, the vital period of her existence, survival, and growing-up, Australia was in no position to defend herself. It was a period of intense activity, of national development, of a great increase in the wool industry, the opening up of the gold fields, and of a growing consciousness and awareness, not only by the colonists themselves but by the outside world, that here was a great and growing heritage, a vast land capable of almost unlimited development, a veritable Eldorado. Throughout this period, however, there was no hostile movement towards her shores, not even threats or overt actions. The infant nation cultivated its garden and grew to manhood untroubled by the threat of an enemy. No enemy foot was set or has ever been set, on Australia's shores. To seek the cause of this immunity we need not seek far. Throughout the whole of this critical century, British sea power was the shield behind which Australia grew up.

A curious paradox resulted as a consequence of this historical fact. From the very nature of their environment the colonists were essentially a land people. It was the broad acres of the interior which beckoned to them rather than the oceans which surrounded them. They realised, however, that their continent had a coastline of 12,000 miles and that it

faced east and west—and north. They knew their own history—that their country had been discovered by Captain Cook, R.N. ; that Sydney had been settled and colonised by the First Fleet under Captain Phillip, R.N. ; that it was the presence of the Navy in the early days which had warned off the French ships which had so quickly appeared on the scene ; and they knew that the first five governors had all been Captains R.N. It was, indeed, hardly an exaggeration to say that the Navy had found Australia, explored and charted it, colonised it, governed it, and then had proceeded to guard it, generation after generation. Sydney, Melbourne, Adelaide, Perth, Brisbane, and Hobart, the colonial capitals and ports, were on the ocean front, facing the sea. No wonder that in the light of all these facts the Australians were not only land conscious but became intensely sea conscious. So much so that when they came to maturity, one of their first actions was the decision to form their own Australian Navy, which was to be their contribution to the great imperial weapon, but which was also to be essentially Australian.

In 1908 the then Prime Minister of the Commonwealth summed up the prevailing spirit in these words :

“ But for the Royal Navy there would be no Australia. That does not mean that we should sit still under the shelter of the British Navy ; those who say we should still are not worthy of the name of Briton.”

The Commonwealth, indeed, had her commitments. There were immigration restrictions ; there were tariffs ; there was the “ White Australia ” policy—and these were commitments which, if challenged, would need defending. In the consciousness of the Australian people there lay quiescent, but none the less vivid, the menace of the Yellow Peril, in short of the Rising Sun, Japan. To them the British “ Far East ” was the “ Near North.” Generations of Australians had inherited a consciousness if not a fear of Japan and of a Greater East Asia. Geographically, Australia was but a southerly extension of a Greater East Asia. Industrially, Japan was an up-and-coming powerful competitor, a menace to the Australian high standard of living. Her people were a militarist, warlike, martial race whose navy, since Togo and Tsushima, had acquired a great prestige ; and the Australians were neither militaristic nor warlike. They wished only to be left alone to develop their own great land in peace and comfort and to preserve and foster a standard of life and living which should be the highest in the world.

All this was vouchsafed unto them. In the 1914–18 war, the particular and potential enemy proved to be no enemy at all, but a faithful ally. No threat to Australia came from the Near North. There was, indeed, hardly a threat at all to the distant Antipodes, except in the general sense that the menace of German militarism lay over the whole world and threatened the British Empire itself. In any case, Britain was in danger, and to the most British and most ardent of the Dominions that was enough.

It has been said that the Anzac spirit proved to the world that Australia had found not only her own nationhood but her soul. For the first time in her brief history she became deeply involved in a terrible and devastating war—a war fought far from her own shores, but a war which left a quarter of a million homes in mourning. Sixty thousand soldiers, the youth and very flower of Australia’s manhood, never returned, leaving a profound and permanent gap in the national life from which it has never and perhaps may never recover. From that ordeal, Australia emerged head erect, her confidence in herself confirmed, her pride in her Anzacs established.

Nevertheless, the war had not come to her own doors ; no enemy had set foot on her soil ; he remained distant and far off. The danger had been avoided. Australia settled down once again to cultivate her garden and to cut her defence forces to the bone, a process sharpened by the great depression and by the growing influence of those who saw in every uniform and every gun the hated symbols of " militarism."

The course of events, however, both in Europe and in the Near North again cast their shadow over the Commonwealth. In 1931 the strength of her naval, military, and air forces had fallen to a mere skeleton owing to the economic blizzard, and a few years later Hitlerism and Nipponism were rearing their ugly heads. More money became available as the times improved ; the British Government made a gift of a destroyer flotilla, afterwards famous as the " Scrap-Iron Flotilla." Three new six-inch cruisers were ordered, Sydney, Hobart, and Perth ; similar expansion began to take place in the military and air service, and behind all was the rapid growth of the industrial resources of the country. Even during the worst years of the depression it had been possible to maintain a " paper structure " for expansion on a considerable scale. An infantry " division " might be represented by a platoon and some flags, a squadron by one cruiser and a destroyer ; but the organisation was intact and plans for mobilisation were in being and were in fact rapidly put into execution.

The earliest action taken by the Commonwealth Government was to place the Australian naval forces at the disposal of the Admiralty. In times of peace the Government had been both zealous and jealous in maintaining its own administrative and operational control of its ships. Once war was declared, however, the whole of its resources were declared to be at Britain's disposal and ready for complete integration with the Empire's resources. This was one war, not two—and the co-ordination of the Empire's resources into one pool and under one directing Joint Staff Committee was perhaps the most signal example of Empire unity, involving as it did the surrender of the Dominions' " sovereign " rights for the time being.

The three essentials which faced the Commonwealth Government were the safety of her troop convoys, the safety of her trade routes, the safety of her coastal waters. The development of Japan's offensive and later of the United States offensive in the South-west Pacific placed a dual task upon the limited Australian resources. First there was the maintenance of the long lines of sea communication and the task force operations for the recapture of strategic islands ; second, the defence of her own enormous coastline. Japan's failure to maintain her sea communications was an important factor in the turn of the tide in the Pacific war. The Japanese advance on Port Moresby was the critical phase, pointing to the invasion of Australia. This was the bugbear and the nightmare which had worried Australians for three generations. There seemed every possibility now that the Yellow Peril was at hand. The battle of the Java Sea on February 27 marked the nadir of Australian efforts to stem the southwards approach of the enemy ; the battle of the Coral Sea indicated the turn of the tide.

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While these great events were taking place in her own waters, Australia was making a very full contribution to the defeat of Germany. Although the sudden and unexpected rapidity and rush of the Japanese advance showed clearly that she would require every ship, man, and gun in her

defence, she was sending important contributions of men overseas, notably to the Royal Air Force, a division which took its part in the Battle of El Alamein, and a very special contribution of young Australians under the "Yachtsman's Scheme" to serve in and with the Royal Navy in European waters. By June 1944 there were more than 500 Australians on loan to the Royal Navy, of whom more than 400 were Volunteer Reserve.

Meanwhile her shipbuilding and industrial resources were expanded with astonishing rapidity. The conversion of merchant ships and the building of landing craft, minesweepers, store carriers, and other auxiliaries were carried out at yards all round the coast. The construction of new ships, including "Tribal" destroyers, frigates, sloops, minesweepers, patrol boats, and other craft, was carried out on a large scale, although on the outbreak of war there was virtually no shipbuilding industry in existence. The country was desperately short of manpower, a chronic weakness owing to its small population, and yet Australia was the only place in the South-west Pacific where industrial resources on an adequate scale existed. In addition to new construction, the average monthly tonnage of damaged ships repaired crept up to 1,000,000 tons; in addition, 115,000 tons of shipping was dry-docked and slipped monthly, and at every major port full facilities for de-gaussing were available. The personnel of the Navy rose from 5,000 on the outbreak of the war to 40,000; all the naval personnel was volunteer; and training schools—including Damage Control and Fire-fighting, Combined Operations, Anti-Submarine, Gunnery, etc.—were instituted which were used also for New Zealand and also for R.N. personnel of the British Pacific Fleet on its arrival.

In addition, naval ordnance, depth charges, ammunition up to six-inch, and torpedoes were all manufactured in Australia. The local manufacture of naval stores of all species expanded to an astonishing degree. Provisions were supplied through the Naval Victualling Branch to Admiralty, War Office, India, and the Middle East. All clothing was of local manufacture and was also supplied to Admiralty yards in Colombo and South Africa and to visiting R.N. ships.

In addition, Australia was shipping overseas a maximum amount of food, including wheat, meat (frozen and chilled), dairy products, metals and other products, agricultural and manufactured, both to the several theatres of war and for civilian consumption in Britain.

Hitherto, until making her great industrial war effort in 1940-45, she had been chiefly an exporter of primary products, but the revolution effected in her internal economy during those five critical years had a profound effect on her industrial and economic structure. Within that short period of five years the industrial development and capacity of the Commonwealth has been advanced to an extent which in normal times would have occupied a whole generation. Before the war the so-called primary industries easily led in total value of national production, but in 1943-44 this situation was materially changed and industrial products drew level. To-day a very large number of male and female workers have been trained in the production of machine-guns, field guns, A.A. guns, armoured vehicles, tanks, aeroplane and motor-car engines, and now in jet-propelled aircraft and even guided missiles. More than 30,000 employees were in the aircraft industry alone. The Lincoln heavy bomber, the Tudor transport, the Mosquito, and the Mustang were all built locally, and their construction forms the background of Australia's post-war air defence scheme.

It is an old truism that Australia's industrial resources have been barely scratched. She appears to possess nearly everything essential to the development of a modern industrial state except flow oil, and a very vigorous search is about to be undertaken for that. Her material resources are, indeed, unlimited, and it is obvious, at the merest glance, that the continent's development has scarcely begun. She is peculiarly rich in metals, coal, wool, and food production of all kinds. She is singularly free from those troubles which affect other countries, such as minority problems, racial difficulties, religious, caste, and other differences. Her population is extraordinarily homogeneous : in Australia all are Australians, who, in the ultimate resource, think, speak, and act as one. Pride of country is intense, and though the shattering effects of recent years have impinged upon the remote island continent, bringing it into closer contact with the outside world, that world still remains outside to a great extent. Australians are becoming world-conscious as the result of the world upheaval, but she is still remote, isolated, and apart, with the inevitable time-lag which ensues.

She is painfully conscious of her weakness in terms of population, which reacts both on her capacity to defend herself and to develop her resources. An Australia of 27 millions or even of 17 millions would be a very different proposition to an Australia of only 7 millions. But short of opening her gates to an unrestricted flow of immigrants from all quarters, black, brown, or brindled, there seems no likelihood of any early considerable increase in her numbers. This situation of a strongpost of whites determined to keep their country white is thrown into sharp contrast with the "teeming millions" which lie on her northern boundaries.

In a military sense, the threat from the north has been temporarily removed by the breaking of Japan. The Yellow Peril has receded and the flood spent its course. Japan remains, however, 80 million strong, and with a birth-rate which adds one million new babies every year. Apart from this military contingency, there are the political, sociological, and economic issues arising from the awakening East, brought sharply to Australia's notice by the Inter-Asian Conference at Delhi convened by Pandit Nehru. In one sense Australia is merely a peninsular continuation of the Asian continent. In another, she is a military and defensive bastion in the South-west Pacific. In another, she is an Anglo-Saxon democracy following the pattern of Western civilisation in the distant Antipodes. And she is also a "Middle Power," claiming her right to intervene in and to take part in the post-war settlement of the world.

Internally there is another factor known as "industrial unrest" which causes grave concern. In recent months the results of parliamentary elections in certain States seem to indicate a growing awareness of the dangers to the Commonwealth if this industrial unrest be permitted to continue unchecked. It is not a disease peculiar to the Commonwealth, but its outbreak there shows that even the remote Antipodes are not immune to the insidious activities of a world-wide organisation which seeks to impose on Australia an "un-Australian" regime. Furthermore, the recent revelations of espionage in Canada warned the Government that the same thing could happen there.

In the new atomic age the Australian people are, more than ever, conscious of their destiny and are eager to shoulder the additional responsibilities of their increasing stake in the world. But in the Commonwealth, as elsewhere, the advent of the atomic age has left them confused and

bewildered. New and unknown vistas open before them. The defeat of Germany and Japan has given a breathing space in which to contemplate the future, but from the peculiar circumstances of their location that future is by no means clear. A significant feature is the establishment of the rocket range, an experiment connected solely with defence and offence, and undertaken in conjunction with and under the direction of British experts. The recognition of the claim by the United States to the strategic trusteeship of the former Japanese island groups has brought another immense accession of strength to Australian defence. As Britain relinquishes her responsibilities in India and Burma, the extent of Australian initiative is substantially increased. The rise of the Indonesian Republic of 50 millions on her north-west frontier is another factor, while all around her she sees a decline in the power and prestige of such colonial powers as France and the Netherlands.

For these reasons there is no sense of peace and security for the future, though the immediate future may look safe enough. The chief fear is that in a future struggle Britain herself, the keystone of the Empire, might be "blitzed" into impotence, leaving the scattered elements of the Empire to be mopped up, one by one. Even if the new weapons should destroy Britain's geographical security, Australia would have a good chance of survival, but only if she build up her population and her defensive resources. Herein lies the theory of a redistribution of population and of industrial and military resources, a decentralisation of the Empire's power and the development, on a larger and more intensive scale, of potentially rich and powerful areas in South Africa, Canada, Australia, and New Zealand. Hence the emphasis placed on immigration schemes, on industrial expansion, and on the establishment in the Dominions of plant and factories of the great British engineering and industrial concerns.

It may not, of course, be a policy which commends itself to the mother country, which cannot reasonably be expected to concur in schemes which call for their best workmen and industries to be sent overseas. To this it is replied that there may be no alternative if the dangers of atomic warfare crystallise and increase. Such an empire-wide redistribution of popular and industrial power would mean, in the long run, that Britain would become the centre of a more powerful and more successful group of nations than ever before, and that London would continue to dictate Empire policy.

In the meantime, there is a breathing space in which to consider all the factors in a post-war policy. One of the first practical steps has been the establishment in Central Australia, in the very heart of the aboriginal interior, of a range for the testing of "guided missiles," an indication of Australia's desire to make an ever-larger contribution towards the defence of the British Empire as a whole. To Australia the advantages of such a project are obvious. It immensely increases her capacity to defend herself with weapons of peculiar potency and advantage, in view of her small man-power and vast territory.

To the Empire itself the range is hardly less vital, and the establishment of it in Central Australia is a recognition of the dispersal of the defensive resources of the British Empire far beyond and away from the Old World. Lack of room and density of population in Britain led logically to the establishment of the range in Central Australia. The rocket testing implies much more, however, since it leads on to research in aerodynamics and ballistics, the production of special fuels and propellants,

and the migration of scientific experts to Australia. Furthermore, from Australia's point of view the establishment of the range has a double advantage, since it will bring life and development to the Dead Heart, that vast inhospitable waste of scrub, dead timber, and sand dunes.

Meanwhile, as to the Australian services themselves, no decision has yet been reached as to their unification or reorganisation under one minister and joint staff, as in the United States and Canada. The creation of a council of national defence, with a national security resources board and a central intelligence service have yet to be considered. The visit of Viscount Montgomery to Australia was no doubt taken advantage of by the Cabinet to discuss these matters.

Meanwhile, Australians realise that their commitments and responsibilities have been in no way lessened by the removal, for the time being, of their traditional enemy, Japan. On the contrary, new factors have served only to increase them. Australia is conscious now that she is not only a great Dominion but a new force in world affairs. She has become the leader of the South-west Pacific group, and by establishing close integration between the two Dominions she has increased her stake by the defence alliance with New Zealand. She understands also that Britain can no longer be expected to carry the heavy burdens of the past and that she, with the other Dominions, must undertake their share, a greater share than ever before. The old basis that each Dominion should be responsible for its own local defence has given way to a new and larger conception—to that of Regional Defence, in itself a contribution to the still more comprehensive conception of over-all Empire defence. The Joint Mission established in Melbourne, with its British and New Zealand elements, already serves as a permanent organisation towards this end, and the machinery for a common defence organisation is already being shaped.

In the naval sphere, the battles of Midway and of the Coral Sea, actions primarily between aircraft carriers which decisively ended the Japanese attempt at a seaborne invasion of Australia, made a considerable, not to say permanent, impression on Australian minds. These two actions proved conclusively the value of aircraft carriers to an Australian naval force, but hitherto the Royal Australian Navy had not included such vessels in its composition.

Amid all the confusion and doubts which attend the post-war period and the arguments and discussions regarding the new policy to be adopted, two points emerge with great clarity. Australia is concerned not only with the sanctity of her own shores but with the safety of her overseas trade. The continent has become a vast granary, able to export considerable and increasing shipments of food, of wool, metals, and manufactured goods. Her export trade will increase steadily over a period of years and her interest in these cargoes does not end when they leave Australian ports. Furthermore, for many years to come Australia will be a large importer, and both exports and imports, as she well understands, must be carried in ships. Only small air-borne parcels will be carried to and from her ports in aircraft. The day of the transport by air of bulk cargoes, such as wheat, meat, wool, etc., is not yet.

She is forced back therefore upon the old, the ancient axiom that where the carriage of goods is by sea, they will require sea protection. Australia can be reached only by sea and by long sea passages. Everywhere she looks and however she looks at the basic problem, the old matter of the "sea affair" raises its insistent head. Here is the world's largest island

surrounded by the world's greatest oceans and having a coast-line of 12,000 miles. These are simple geographical facts which appeal by their very simplicity to a people who in the recent war, at the time of the Japanese advance *by sea*, became acutely aware of their reliance on help *by sea*. The memory of those anxious days was burned deep into the minds of the people.

The certitude that, sooner or later, the Japanese would be decisively defeated and their schemes for a Greater East Asia brought to ruin, brought little comfort to a people faced with the imminent invasion of their own land by the yellow hordes. It was the greatest crisis in the whole history of the Australian people. The invader was checked, stopped, and then turned back, but this reversal took place on the sea, and the sea remains the decisive factor in the defence of Australia.

GEOFFREY RAWSON.

CHAPTER IX.

THE RÔLE OF SEA POWER IN GLOBAL WARFARE OF THE FUTURE.

NOWHERE, perhaps, has the confusion of thought brought about by the atomic bomb been more conspicuous or more widespread than in respect to the future rôle of sea power. One group of writers leans over backwards in treating the atomic bomb as just another new weapon, asserting that it has failed to affect the traditional task of the navies, to keep the humble merchantman moving over the sea and protect it from damage and interception, without troubling to examine what functions precisely that humble merchantman may have to or be able to fulfill in future global strategy. At the opposite extreme, others make no bones of their belief that in a conflict to be decided within weeks if not within days by long-range exchange of atomic missiles, there is no longer any place for the slow influence of sea power, and that the best which can be claimed even for naval power pure and simple is that it may provide some slight additional deterrent to an aggressor.

The completeness with which these two opposed views cancel each other makes any attempt to reconcile them out of the question. Their opposition arises less from any disagreement on the basic premises than from the arbitrary and one-sided pursuit of two radically divergent lines of reasoning, leading to the construction of two fragmentary pictures between which there is no common ground. To decide in favour of one or the other interpretation would obviously be as futile as to try to strike some arbitrary balance. The only hope of finding a way out of the impasse lies in making an effort to transcend both of these conflicting, limited perspectives and pursue the issue back to that ultimate frame of reference which alone can permit a full grasp of the situation—the over-all balance of land and sea power.

SEA AND LAND POWER IN BALANCE, 1492-1815.

This over-all balance of land and sea power is not something that arises overnight. It is the final result of the gigantic process through which, during the four and a half centuries since the discovery of the New World and of the sea-way to India, the world has been transformed from a cluster of isolated civilisations into a single strategic whole. It is only by briefly surveying the main phases of this process that we can hope to appreciate properly the rôle which sea power is likely to play in the future.

In the first phase, covering roughly the three centuries from the age of discoveries to the end of the struggle unleashed by the French Revolution and Napoleon, the balance of land and sea power revolved around three major interdependent developments. In Europe, on the one hand, the national states—Portugal, Spain, France, the Netherlands, England, Austria, Prussia, Sweden, Russia—were beginning to emerge from the feudalistic debris of medieval Europe. In them the dominant force, generally the prince, was endeavouring to establish his individual sovereignty with the assistance of a centralised administration, a permanent bureaucracy, a regular income from taxation and customs, and, above all,

standing military forces both on land and at sea. At the same time the new national rulers were involved in a keen and bitter rivalry amongst themselves, resulting in the gradual extension throughout Europe of a new political system, no longer based, like that of medieval Christendom, primarily upon a moral community of thought, but resting upon the purely mechanical balance of physical power.

Parallel to and closely interrelated with this intra-European struggle between the newly emerging national powers ran the other struggle among the same protagonists for the control and exploitation of the vast new territories discovered beyond the seas. For a time, indeed, the effort was made to keep the two struggles apart and to maintain the fiction that what was happening "beyond the line" was of no concern to the relations of the powers in Europe. But this fiction inevitably had to break down, for, far from being irrelevant, the struggle for the colonies overseas actually became the decisive factor in the European struggle. Despite all their effort to set themselves upon their feet, the European powers of that time were still economically in their infancy. Their resources were as yet very inadequately developed—partly because of primitive technical standards and traditional fetters and impediments, partly because of limited manpower, but above all because of the dearth of capital. Bullion was still so inadequate compared with the demand that their economic policies were chiefly directed toward securing the maximum share of it to themselves without any thought beyond, while the development of credit was just beginning. Thus all states found themselves hard pressed to raise the necessary cash from their own internal resources. For such heavy expenditure as the maintenance of armies and navies, particularly in time of war, they had to rely to a large extent upon outside sources, such as colonial tribute, foreign trade, or downright subsidies. The ultimate source of these, however, lay either in the oversea colonies, with their enormous natural resources, or in access to the great markets of the Middle and Far East.

This dependence of the European strength of the powers upon the flow of riches from overseas was recognised by the statesmen of the seventeenth and eighteenth centuries as the very basis of their political system. "I do not know," wrote Choiseul, the greatest exponent of sea power and colonial expansion in eighteenth-century France, "whether they really understand in Spain that in the present state of Europe it is the colonies, trade, and in consequence sea power, which must determine the balance of power upon the continent. The House of Austria, Russia, the King of Prussia are only powers of the second rank, as are all those which cannot go to war unless they are subsidised by the trading powers."

So profoundly impressed, in fact, were the statesmen and political writers of France and Spain with the influence of the balance of economic strength overseas upon the balance of military power in Europe that they were inclined simply to identify the two. "The balance of commerce of the nations in America is as the balance of their power in Europe," wrote Moreau. "One might even say that these two balances constitute only one. Commerce is the strength of the states and a nation which is engaged in it alone is always certain of having the balance of power lean toward itself." And similarly Buchet Dupavillon in 1762: "The possession of America is to-day the most abundant and the most dependable source of political power. It is only by reason of the riches which commerce bears thence that the nations may be compared with each other."

In thus naïvely identifying overseas economic strength with military power in Europe these French and Spanish statesmen and political writers completely overlooked the real crux of the matter, namely the fact that economic strength derived from colonial revenue and trade could become effective in Europe only in so far as it could be safely transferred there; and that in this transit it was—in time of war—helpless before the menace of superior sea power. Not that they failed to recognise the importance of sea power. Their writings are full of it. But they failed completely to understand its essentially monopolistic nature: the fact that, unlike the situation in war on land, at sea the stronger power by securing "command" can achieve for itself absolute control of that element and eliminate its opponents from it altogether. Instead, misled by their familiar notion of the "balance of power," they sought to transfer it from the land to the sea, to acquire "proportionate" and not "superior" navies, and restricted their operations to the direct protection (and attack) of trade and territories instead of directing them upon the acquisition of the "command."

The result was that all the exertions of continental statecraft were condemned to failure and sea power, which at first had tended to shift freely between the various contending naval powers of the western seaboard of Europe, began more and more to gravitate into the hands of the one nation—Britain—which, with ever-increasing sureness, directed its naval strategy consistently upon the "command," until it finally became permanently consolidated there.

Thus the sea power of Great Britain became a third and culminating factor in the over-all balance of power of the period, interposing itself between the rival powers of continental Europe and their overseas sources of economic strength. Its basis was the immunity of the British Isles from invasion. Control over the vital flow of economic strength from its overseas sources to Europe enabled Britain to deny it to her opponents and at the same time redirect it into her own coffers. Instead of financial burdens her wars became steps in her economic expansion, amply paying their cost by the increase in national wealth which they brought about and enabling her to maintain her allies on the continent with her subsidies. Compared with the cardinal importance of this financial stranglehold the other forms of economic pressure—e.g. through the interception of grain or naval stores, etc.—as yet played only a secondary rôle, limited to individual instances.

At the same time Great Britain was able, from the safe basis of her "command," to use her naval and military forces with complete freedom in order to bring them to bear with maximum effect upon the course of the continental struggles. Owing to the primitive state of the general economy and hence of military organisation, these continental wars presented opportunities for intervention which were hardly less favourable than the ability to cut the umbilical cord across the ocean. Limited in scope, the continental wars tended to concentrate around certain key areas, three of which—the Low Countries, Catalonia, and the Riviera—were readily accessible to the intervention of naval forces. Through naval bombardments, the cutting of the enemy's coastal supply lines, the convoying of friendly military expeditions, last but not least through the mere moral influence of their presence, her limited forces could exercise an influence out of all proportion to their intrinsic strength. On a still higher plane her relative freedom from territorial entanglements together with her financial strength

enabled Britain to exploit the rivalries between the continental powers and to mobilise their continental rivals against her opponents of the moment.

Thus sea power in this its classic age was a highly complex factor, defensive as well as offensive ; economic or, more specifically, financial as much as military ; achieving its greatest effects not so much by its own intrinsic strength as by its skillful exploitation of the weaknesses of its opponents. By its aid first the Portuguese, then the Dutch, and finally the British were able to wield an influence out of all proportion to their size, resources, and man-power. Thanks to its unique key position Great Britain was able not merely to control the flow of overseas treasure but to manipulate on the continent of Europe the balance of half a dozen powers, each intrinsically superior to her in every other respect.

THE BALANCE DISTURBED, 1815-1900.

The wars of the French Revolution and Napoleon mark the culmination of the classic age of sea power and the beginning of its transformation in the nineteenth century. While classical sea power achieved its apogee under Barham and Nelson, the tripartite " pattern of power " upon which it had rested was already beginning to crumble away. On the one hand the colonies in the Americas, which had played so decisive a rôle right up to the end of the period, broke away from their European mother-countries in the decades following the American Declaration of Independence. On the other, the colonial powers of western Europe freed themselves to a considerable degree from their economic dependence upon their American colonies and tended increasingly to turn eastward toward a closer integration with eastern Europe.

Napoleon himself broke signally with the policies of Choiseul and Vergennes when he decided to liquidate his ambitious dreams in the western world and to sell Louisiana to the United States. He could turn his back upon its resources because the revolution in land warfare which he had brought to its culmination enabled him to find substitutes for these resources on the Continent itself. By increasing the range and speed of his campaigns beyond anything his eighteenth-century predecessors had been able to aim at, he was able gradually to lay the whole of Europe under tribute and to make war pay for itself. At the same time his vast expeditions, from the Tagus to Moscow, together with the Tsar Alexander's counter-offensive from Moscow to Paris, for the first time spanned the whole of Europe under a single strategic and political system. At the Congress of Vienna western and eastern Europe were for the first time consolidated into a united continent.

For the next sixty years the " Concert of Europe " was mainly pre-occupied with the settlement of the continental problems arising out of the heritage of the French Revolution and the dissolution of the Ottoman Empire. At the same time the administrative and economic consolidation of the European powers under the double impulse of the French and of the Industrial Revolutions radically transformed their dependence upon outside economic resources. On the one hand, the financial weakness which had been the outstanding characteristic of both the great and the smaller European states was radically overcome. The subsidies so characteristic of seventeenth- and eighteenth-century warfare disappeared ; henceforth even the smaller European powers were sufficiently developed

to finance their armed forces normally out of their internal revenue. On the other hand, growing industrialisation inevitably increased their dependence upon bulk imports, such as raw materials and foodstuffs. But in the nineteenth century this new form of dependence upon overseas economic resources was still in its beginning and, moreover, was rendered less acute by the development of the railway net, making possible an emergency switch to imports from neighbouring European powers. Thus the wars of the mid-nineteenth century in Europe gave remarkably little indication of the new economic stranglehold of sea power which was even then in the making. Only under special conditions in overseas warfare, as in the blockade of the Confederacy in the Civil War, did sea power display all its former strength, largely in the form of the old-time financial rather than the new supply blockade.

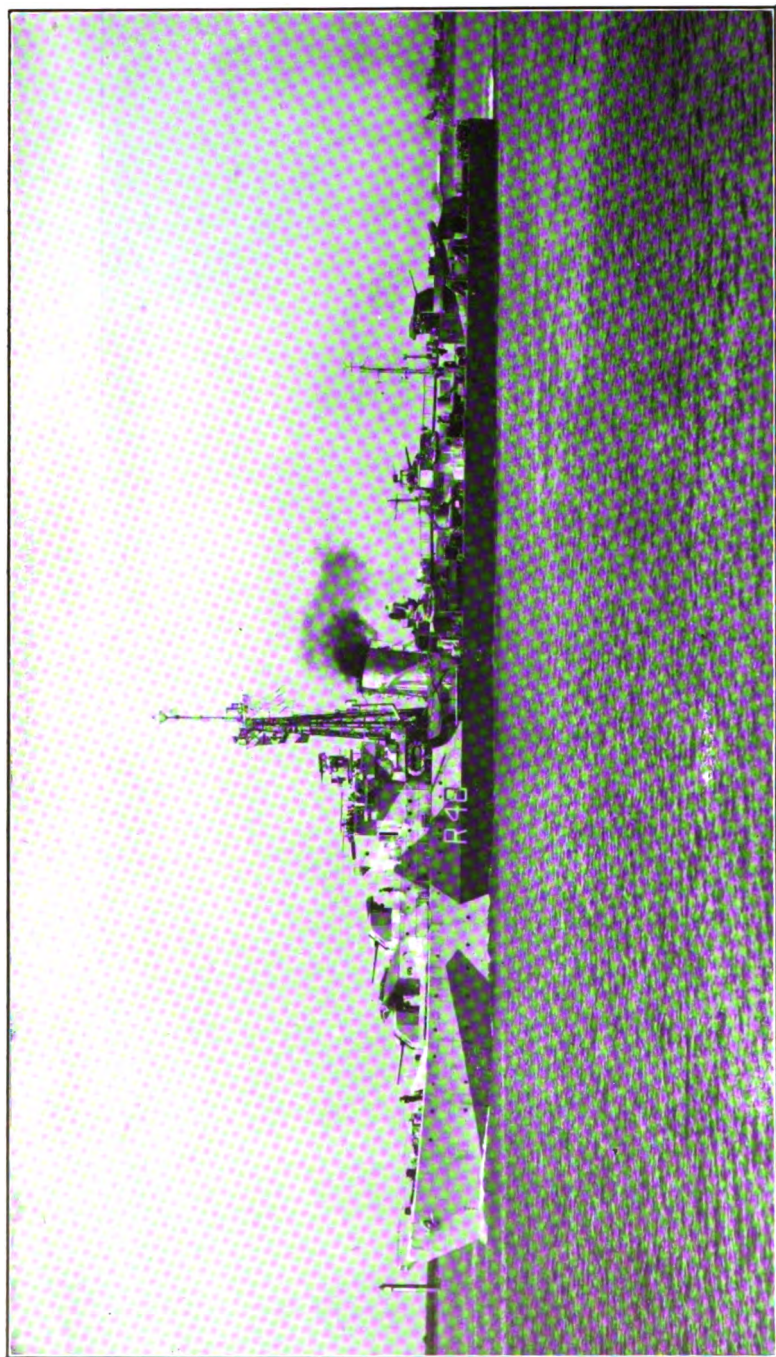
Parallel with this development, the ability of sea power to intervene on the land with small combined forces likewise underwent a profound modification. The disproportionate effect of this type of operations in the days of classical sea power had depended largely upon the specific weaknesses and limitations of the land forces of those times; but these had in the meantime been completely overcome. In particular, such operations had depended upon the superior mobility of naval forces as compared with the primitive, slow-marching land forces of the time. The development of an efficient railway network all over Europe changed this condition radically to the detriment of sea power. In the second half of the century experienced commanders, like Moltke, felt able to deal with any landing within twenty-four hours.

Above and beyond all this, the development of land warfare had brought about a fundamental change in the relative balance of land and sea power which affected the latter simultaneously in both its economic and its military aspects. In the days of classical sea power the basic reason why it had been able to bring its influence to bear so successfully had been the extreme duration of the wars of that age. The limitations and the inconclusiveness of the campaigns on land resulted in a prolonged dragging out of conflicts, which gave full opportunity for the slowly working influence of sea power to make itself felt. The War of Spanish Succession lasted no less than twelve years, that of the Austrian Succession nine, the Seven Years War and the War of American Independence each seven. But the revolution in land warfare started by the French Revolution and completed by Napoleon, by increasing the speed, range, and effect of campaigns beyond anything previously thought of, made land campaigns both conclusive and swift. None of Napoleon's major wars lasted more than about a year; most of them were decided within a few months. Since, however, they followed each other in such rapid succession and because, with a single brief interruption, Great Britain was continuously at war with Napoleon, the slow action of British sea power nevertheless found full time to assert itself. The wars of the middle of the nineteenth century, however, such as the Franco-Austrian, German-Danish, Russo-Austrian, and Franco-German, were all conflicts of limited intensity and scale and were brought to so rapid a conclusion by the new decisive strategy introduced by Napoleon that sea power, most clearly in the last case, no longer had the time to interfere effectively.

Under the combined impact of these various tendencies the third and central factor of the tripartite system of balance of land and sea power—British sea power—likewise underwent a series of profound modifications.



H.M. Submarine Talent.
(Courtesy of Messrs. Vickers-Armstrong.)



H.M. Destroyer Wrangler.
(*Courtesy of Messrs. Vickers-Armstrongs.*)

In the first instance, the consolidation of both the new states in the Americas and the European powers had in general begun to reduce her influence of sea over land power. Secondly, with the loss of Britain's financial stranglehold the ability to make wars profitable instead of costly disappeared for ever. Above all, however, the partition and opening up of most of the remaining overseas territories, in which Great Britain was the primary beneficiary, proved to be at the same time an asset and a liability. On the one hand the extension of her possessions into a world-wide empire gave her a globe-encircling network of actual or potential naval bases; on the other it saddled her with a defensive problem which was to become increasingly difficult of solution.

The greatest strength of British sea power in its classical period had lain in the fact that it was able to compress all its manifold offensive and defensive functions into a single task of relatively limited dimensions, the establishment of the "command" of the Narrow Seas of Western Europe. By establishing her control over the other naval powers along the western seaboard of Europe Great Britain had been able to ensure simultaneously the security not only of the motherland but of all her widespread colonial possessions, intercepting at the source any possible enemy attack upon her, which at that time could come only across the sea.

Now that her empire had expanded over vast tracts both of Africa and Asia, the outward thrusts of France in North Africa, of Russia all along the line from the Straits to the Far East, and of Germany along the line of the Bagdad Railway threatened her with a series of overland attacks which she was incapable of intercepting and against which her sea power provided no defence. Hardly less perplexing was the simultaneous "distraction" of her sea power itself through the rise of new centres of naval power beyond the orbit of her "command" over the Narrow Seas: the appearance of a Russian fleet in the Black Sea and in the Far East and the rapid rise of the naval power of the United States and of Japan. Her unique string of naval bases enabled her, indeed, to project her sea power to any area in the globe where it might be needed; but even with a greater force than she ever possessed she could no longer hope to meet and control all of them simultaneously—as she had been able, at the height of her strength, to dominate the combined strength of all other naval powers in the Narrow Seas of Western Europe.

The full significance of this perplexing development had not yet had time to reveal itself when the new menace of rapid rise of the German Navy, within striking distance of the British home base, cut it short for the time being. Faced with this new and most dangerous threat, the British statesman and naval leaders decided to concentrate all their forces against it, freeing them from their commitments in other areas by a series of political alliances and understandings with France and Russia, Italy, Japan, and the United States. By thus temporarily relieving themselves from the perplexing multiplicity of their defensive commitments they were able to concentrate them once again, as in the days of classical sea power, in one undertaking of limited scope—domination of the German High Sea Fleet, thereby assuming security both for homeland and empire, the isolation of Germany's overseas possessions, and the security of Britain's sea communications—although the new weapon of the submarine harassed the latter to an infinitely higher degree than the commerce raiders of the old wars had ever been able to do.

A NEW BALANCE, 1900-46.

In a survey of the development of the pattern of land and sea power the First World War carries a Janus face. In its restriction of the military struggle once again in the European continent and its adjacent Narrow Seas it looks backwards to the classical age of British sea power. In its acceleration of the new economic and military trends of sea power, on the other hand, it marks a radical break with the classical pattern and the inauguration of a new one that was to be fully developed in the Second World War.

On the economic side, as the result of the tremendous intensification of industrial production and world-wide economic interdependence in the second half of the nineteenth century, the disappearance of sea power's one-time financial stranglehold upon the resources of the European powers was replaced by a new economic stranglehold over their imports of basic necessities such as foodstuffs and raw materials. So decisive was the impact of this new economic stranglehold in the First World War that it promptly brought about a reaction against it. True, the effort of all the major powers in the following decades to effect a systematic reorganisation of their economies for total mobilisation and to secure maximum independence from outside supplies in every case fell short of the achievement of complete autarky. But the strengthening of their ability to resist all forms of economic dislocation and pressure was remarkable enough to make naval blockade in the Second World War—with the exception of the case of the Japanese Empire—a markedly less decisive instrument than in the first.

On the military side, in the meantime, sea power was beginning to expand its activities beyond anything it had previously been able to aim at. In its classical age, as we have seen, British sea power had held the key to the balance of power on the European continent by its political and financial influence. Militarily, however, its strictly limited resources had forced it to concentrate its main effort upon the acquisition of the "command" of the Narrow Seas and to restrict its direct intervention in the struggle on the Continent itself to smaller or greater diversionary operations "on the fringes."

With the First World War this state of affairs underwent a radical change, which is reflected in the strategy of both of the major sea powers, Great Britain and the United States. In that conflict the inability of their continental allies to hold their own against the onslaught of the Central Powers, together with the decline in the diversionary effect of small amphibious operations, forced the Anglo-American powers to leave their traditional place on the side-lines and to utilise their sea power in order to project their full military strength directly into the decisive area of conflict. This shift of sea power from a position on the fringes to direct intervention in the crucial central issues, from an instrument of opportunism to the bearer of the decisive military operations themselves, culminated in the Second World War, when the expansion of the struggle from its limited origins to embrace virtually the entire globe, fused oceans and continents permanently into a single strategic chessboard. In this conflict, in which the all-surrounding and interpenetrating unity of the oceans for the first time revealed its full significance in relation to the isolated and divided continents, control of that universal medium of mass movement became the decisive card, the indispensable prerequisite of any world-wide combination.

Thus in global warfare, sea power had at last come into its own and achieved its full stature. Behind its shield the two Anglo-Saxon democracies were able to hold out, to mobilise their forces, and to plan and launch their counter-attacks at their own chosen times and places, to exploit the traditional advantages of combined operations on a global scale and with land and air forces of the largest magnitude.

Above all, their "command of the sea" enabled them, on the highest plane of over-all global strategy, to keep their two groups of opponents apart, while concentrating their own efforts successively against first one and then the other. This they were able to do because the expansion of the struggle from Europe to the globe had left the greatest traditional asset of sea power, the division of the continental powers among themselves, unaffected, thus enabling them to hold their opponents apart by supporting against them the triple barrier of Russia, India, and China.

THE STRATEGIC POSITION TO-DAY.

It is against the background of this whole gradual evolution of the balance of land and sea power that the wholly novel situation that has arisen since the end of the Second World War must be viewed in order to be properly understood and evaluated.

Through the collapse of Germany and Japan the balance among the land powers—which, since the days of the Renaissance and of the great discoveries, has formed the one essential element in the pattern of land and sea power—has been one-sidedly overthrown and supplanted by "monolithic" predominance of Russia not merely over the whole of continental Europe, but of the continental Old World. Against the tremendous concentration of central position, vast man-power, natural and industrial resources, ideological unity, and determined leadership, neither India nor China are for the time being in a position to constitute anything like effective counterweights. The same is even more true of France, the only other considerable power left on the continent.

The result is that sea power has found itself drawn into the continental balance as never before in history. Whereas Britain in her classical period was able to maintain the balance between the conflicting representatives of land power from the outside and whereas in the two World Wars the two sea powers were forced to supplement it by direct intervention in the continental struggle, they are now in a position where they are forced to provide the major effort in upholding it against the concentrated weight of land power in the hands of Russia.

Such a balance as this must necessarily remain highly precarious. The reduction of the main component powers from a group of some eight to ten to a bare three has almost completely destroyed the permutability of combinations and counter-combinations upon which depends the functioning—and in particular the flexibility—of an effective system of balance. The unfortunate result has been a rigidity in the international situation which in every major disagreement has led inevitably to a head-on-clash between the Soviet Union on the one side and the two Anglo-Saxon democracies on the other—a state of affairs which in the long run must prove as unfavourable to any *détente* of minds as could possibly be conceivable.

This psychologically extremely difficult situation is further aggravated by the fact that between the two groups there is no broad middle ground

on which to make each other concessions. Perhaps the most disturbing material factor in the situation is precisely the fact that the two groups are so closely arrayed against each other all across the Old World that any appreciable advance of one or the other side threatens to overthrow, decisively and irrevocably, the strategic security of the other. At the same time there are also no longer any powers outside of the initial balance upon which one side or the other could fall back, as Britain did upon the United States and the Axis upon Japan in the Second World War. With the entire power potential of the globe already included in the original balance there is no longer any outer fringe not yet drawn into it nor any leeway left for concessions—any extension of force in depth to fall back upon in order to advance again later.

From the point of view of sea power the most disturbing aspect of this unprecedentedly tense strategic alignment is the fact that it repeats on the widest possible scale the most serious threat which sea power has had to face in its age-long tug-of-war with land power—the threat of being defeated by land power not on its own element, the sea, but simply by its systematic exclusion from the continent. The apprehension that a land power which had first made itself master of a united continent would then be able to overwhelm Great Britain by concentrated weight of naval power was the deepest motive at the bottom of the traditional British policy of the balance of power. On the economic side Philip II of Spain as early as the sixteenth century first toyed with the idea of ruining Britain by excluding her from the continental markets. Silhouette in 1789 and Choiseul in 1762 took it up again in France. The elder Pitt and Newcastle both feared it. Napoleon combined both menaces in the powerful fleets which he continued to build in his ports long after Trafalgar, as well as in his Continental System, which miscarried only because of the inconsistency of his measures and the unexpected success of the British in opening up new markets overseas to replace those closed to them on the Continent. While this *financial* threat disappeared in the course of the nineteenth century, the *military* menace increased with the expansion of the great European Powers overland, the increasing mobility of land forces, and above all the coming of air power, until in the years before the Second World War a powerful German-Italian-French school of military thought openly proclaimed the exclusion of sea power not only from the land, but even from the adjacent coastal waters within reach of land-based aircraft. Ideas of this kind undoubtedly exercised a considerable influence upon Hitler's plans for a conflict with Great Britain,* culminating in his attempt "to unite under the same domination both Russia and Europe, in order the better to overcome, by the conquest of the land, the intangible and invincible empire of the sea."†

To-day the U.S.S.R., having virtually achieved what Hitler attempted in vain, stands on the threshold of realising that centuries-old dreams of land power which has persisted from Philip II to Napoleon and Adolf Hitler. From her position astride the great Eurasian Plain, Russia could by a few relatively short advances in Central Europe, in the Middle East, and possibly in North China make herself for all practical purposes mistress of the continental block of the Old World north of the great desert belt. This would not mean in itself that the sea powers would simply be constrained to bow without hope before her domination; but it would mean

* Conference of May 3, 1939; Memorandum on War in the West of October 9, 1939.

† Gafencu.

that in any conflict, whether with the traditional weapons or with the new instruments of the atomic age, they would find themselves so heavily out-matched in man-power, in resources, and above all in territory that their chances of a successful resistance would be precarious indeed.

THE EFFECT OF NEW WEAPONS.

The establishment of this new world-wide balance of land and sea power, in which the long process of the strategic unification of the globe has finally culminated in our own days, constitutes thus the outstanding event determining the whole political and military development of our world. Yet, despite the over-abundant lip-service to the abstract notion of "one world," the concrete significance of this momentous event for the shaping of our political and military world structure has been strangely beclouded, and for the time being almost obliterated, by the conjunction of two other simultaneous developments.

On the one hand, the great advance toward better understanding and co-operation between the nations of the world in the establishment of the United Nations has, unfortunately, entailed the inevitable drawback that by being forced to presuppose a harmony which does not as yet exist it has fostered a habit of political make-believe in which the great tensions which are the dominating factors of our age have not indeed disappeared, but are only occasionally admitted. Much of the discussion of the new peace machinery of the United Nations has been vitiated by the tendency to ignore such real conflicts and to cling—in public—to the pretence of a non-existent harmony endangered by a purely hypothetical "aggressor"; with the result that nobody is fooled, but that the real picture and its issues are seriously distorted by the purely fictitious abstraction of the frame of reference.

On the other hand, to this *theoretical* abstractness of the *political* aspect of the problem of world security must be added the *technological* abstractness of the *military* debate aroused by the atomic bomb. This debate, which for the most part has completely disregarded the broad global background to which the preceding chapters have sought to redirect attention, has thus far tended to concentrate one-sidedly upon a purely abstract picture of the probable nature and course of a future war, derived exclusively from the physical properties of the bomb itself.

The convergence of these two wholly one-sided abstractions has resulted in a conception of future atomic (rather than global) warfare whose main features are as yet purely hypothetical, but which has been accepted with such unquestioning fervour that it has come to assume the character almost of an *idée fixe*.

The core of this almost universally accepted conception of atomic warfare embraces three closely interrelated "dogmas": first, that any atomic war will inevitably begin—and practically end—with a surprise knock-out blow by massed atomic weapons, an "atomic Pearl Harbour"; second, that atomic war will be almost unbelievably short, a "superblitz" to be decided in a few hours or, at the most, a few days or weeks; third, that it will be waged and decided essentially if not exclusively by atomic weapons or even more sinister new forms of warfare.

This idea of eliminating at one fell blow the entire offensive and defensive power of a prospective victim or opponent may appear absolutely compelling if viewed from the point of view of hypothetical "aggressor"

guided exclusively by abstract inferences derived from the physical characteristics of the bomb itself ; but it becomes markedly more questionable—not to say dangerous—the moment an attempt is made to apply it to the concrete realities of the present world situation.

First and foremost, it one-sidedly focuses all apprehensions of a possible Russian aggression—since the sea powers by no stretch of the imagination could possibly be conceived as conspiring for an atomic surprise attack upon anybody, not even Russia—upon such an atomic surprise attack and thus completely obscures the far more probable and, in the long run, far greater danger of a successful Russian infiltration into the crucial key areas in the global balance of power. Far more probable, because such infiltration tactics would be infinitely more in accord with the whole strategic position, peculiar strength, and imperialistic tradition of the Russians ; far more dangerous, because being a political rather than a military form of action it would be capable of infinite gradations, even if necessary of complete temporary suspension without undue loss of prestige, until such time as a relaxation of watchfulness on the part of the Western democracies gave it the chance to succeed and thereby to decide in advance the issue of a final atomic showdown.

Secondly, in its purely abstract, rationalistic approach, this theory tends completely to forget how desperate and improbable a gamble would be implied in even the best-conceived and most elaborately prepared “absolute declaration of war” : a gamble certain to provoke moral repercussions of almost incalculable dimensions for the sake of a military success which would, at best, be highly questionable. True, the Japanese militarists took such a chance at Pearl Harbour, because the military success they were aiming at was strictly limited ; because in their ill-advised contempt for the American character they discounted the moral repercussions ; and, in the last resort, because with the oil embargo rapidly diminishing their ability to act at all, they felt they had no other choice. But none of these reasons would hold good for the Russians in such an incomparably greater gamble. It is difficult to conceive them as ever manœuvring themselves into a situation in which they would similarly be constrained to stake everything upon one throw of the dice. The military success which they would require, moreover, would have to be not merely total and immediate, but as absolutely certain as anything could humanly be ; while their entire training and ideological orientation would certainly lead them to attach the fullest imaginable weight to the avalanche of moral condemnation which so flagrant an act of aggression would be certain to produce.

So susceptible, in fact, have the Russians already shown themselves to the growing pressure of world opinion that it looks at this moment as if the international system of control of atomic armaments to be established under the auspices of the United Nations—while it might perhaps not of itself eliminate war, nor even the eventual use of atomic weapons, should war unfortunately break out again—may still be sufficiently effective to wipe out at a single stroke precisely those most staggering features of atomic warfare upon which the current debate has most unquestioningly tended to base itself. For, while it would perhaps be unwise to assume that such control, however well organised, would be able to prevent *any* contravention, one would imagine that it should at least be able completely to suppress any clandestine *mass* production of atomic weapons. But without mass piles of atomic bombs, as has rightly been pointed out, no

atomic Pearl Harbour would be possible. The terrible gamble which it would represent at the best would become wholly unconscionable if the aggressor did not at least have at his disposal not merely hundreds but thousands of these most dreadful instruments of destruction—in order to be able not merely to swamp all defences, but to continue to follow up the initial crippling blow for a period whose length it would be impossible to define but which would certainly have to extend beyond anything so far conceived of in the discussion of atomic warfare.

For, like the dogma of the inevitably and decisive effect of an initial atomic surprise attack, the second closely related dogma of the atomic creed, the extreme shortness of a future conflict, reveals itself upon closer scrutiny as another purely abstract consideration drawn from the physical properties of the bomb without reference to the broad aspects of the concrete world situation. For if, as we believe probable, that initial surprise attack should after all fail to materialise, or, materialising, fail to produce the decisive effect ascribed to it, the entire situation would seem to tend in exactly the opposite direction—toward a conflict not merely fierce but prolonged beyond anything mankind has known since the Thirty Years War. On the one hand, the fundamental character of the issues involved—since in the present state of world conscience only fundamental issues would be able to bring about and permit such a conflict—together with the certainty that any defeat would be absolute and irrevocable, would endow it with a moral intensity approaching the “absolute character” of the life-and-death struggles between primitive tribes. On the other, the widespread use of long-range missiles, whether with or without atomic warheads, would inevitably tend to destroy and disrupt the apparatus of industrial production and transportation to such an extent as to make any effort to bring about a decision slow and difficult to an as yet inconceivable degree, to say nothing of the appalling areas and distances involved.

Yet so hypnotic has been the emotional appeal of the orthodox doctrine of atomic war that even those who are inclined to deny its basic premises concerning the decisive effect of an initial knock-out attempt—or at least to insist that it could be prevented from becoming so by the necessary precautions—can so little free themselves from the larger concept that they continue to think exclusively in terms of an incredibly short war waged and decided by essentially atomic weapons. Yet if, as this school maintains, a Russian atomic mass attack (and even more a surprise attack) against the uniquely concentrated targets presented by the war potential of the United States could be prevented by appropriate counter-measures from achieving a decisive effect—or even seriously impairing the ability to launch retaliatory atomic counter-attacks—what possible chances to achieve a decision, and even more a quick decision, would these counter-attacks have against so incomparably more dispersed, concealed, and inaccessible targets as the Russian war industries and transportation? Here we patiently approach the domain of the supra-natural: *credo quia absurdum*.

The dangerous delusion in this line of argument has been clearly exposed at the very outset of the atomic debate by a man whose opinion in all military matters should weigh most heavily not merely in his own country but the world over: “The only effective defence a nation can now maintain,” wrote General Marshall in that portion of his final report which can aptly be described as his military testament in matters of atomic warfare,

"is the power of attack. The classic proof of this came in the Battle of Britain. Even with the magnificent fighter defence of the Royal Air Force, even with the incredible efficiency of the fire of thousands of anti-aircraft guns controlled and aimed by unerring electronic instruments, the British Islands remained under the fire of the German enemy until the final stages of the war.

"Not until the American and British armies crossed the Channel and seized control of the enemy's territory was the hail of rockets lifted from England. Not until we had physical possession of the launching sites and the factories that produced the V-weapons did these attacks cease.

"Such is the pattern of war in the twentieth century. If this nation is ever again at war suffering, as Britain did in this war, the disastrous attacks of rocket-propelled weapons with explosive power like our own atomic bomb, it will bleed and suffer, perhaps to the point of annihilation, *unless we move armies of men into the enemy's bases of operation and seize the sites from which he launches his attacks.*"

THE FUNCTION OF SEA POWER UNCHANGED.

Thus from the shouting and the turmoil of the atomic discussion General Marshall's pertinent reminder leads us back to the global balance of land and sea power as the ultimate determinant of our present political and military situation. Just as defence on a purely national or even imperial scale no longer suffices for the preservation of peace and has to be expanded into the maintenance of the global balance of power within the legal framework of the United Nations; so, in the unfortunate case of a collapse of that balance and the outbreak of another world-wide conflict, mere defence against an atomic attack, or mere retaliation and counter-attack with atomic and other missiles, would be wholly insufficient to eradicate the menace and clinch the issue unless followed up with the only ultimately decisive form of warfare—the defeat of the enemy's ground forces and the occupation of his territory.

That means, however, that even in atomic warfare global strategy must continue to rest ultimately upon sea power, which alone is capable of assuring the transportation across the broad oceans of the masses of men and of goods which are needed, if the military balance of power is to be upheld and decisive victory ultimately secured. That basic rôle, air transport as yet appears unable to take over in the foreseeable future, however amazing and gratifying its recent spectacular development; although we may rightly expect it to assume a large, possibly the pre-dominant share of the transportation effort within the different theatres of war. In the same sense, the basic effort towards the breakdown of the enemy's powers of resistance will have to rest with the combination of blows of mass armies and air forces, while the promising new instrument of air-borne attack will constitute a trump card in highly concentrated operations against key enemy positions.

That, however, confronts the sea powers with a difficulty which it would be futile to deny and which has never been put more clearly than by Mr. Winston Churchill at the most critical period of the recent struggle. "The whole power of the United States, to manifest itself in this war," he pointed out in the House of Commons on October 31, 1942, "depends upon the power to move ships across the sea. Their mighty power is restricted, it is restricted by those very oceans which have protected them. The oceans, which were their shield, have now become a bar, a prison-house, through which they are struggling to bring armies, fleets, and air forces to bear upon the great common problems we have to face." The sea powers, in other words, were forced by their very nature and position to seek to project their strength across the always infinitely more vulnerable sea lanes against

an enemy able to operate not merely on interior lanes but along the incomparably quicker and safer lines of land communication.

This same situation would, in a possible conflict between Old and New Worlds, again prove the outstanding strategic problem of the sea powers—a problem whose solution would call for all the skill and ingenuity of their Navies. Not only would they have to cope at sea with the new and incomparably more dangerous instruments of submarine attack which had already been developed at the end of the Second World War, but had not yet had time to come into operation. In addition the development of long-range missiles would confront them with an even more formidable threat in precisely those key places where hitherto they could count upon at least a measure of security: the points of embarkation and debarkation. It is obvious that these fixed, concentrated objectives would prove incomparably more attractive and lucrative targets for long-range missile attack than widely dispersed fleets or convoys moving upon the high seas. The more so if we take into account what has been perhaps the most striking lesson of the Bikini experiments: the fact that the most dangerous property of atomic weapons is neither their blast effect nor their heat, but their contamination of the whole surrounding area with deadly radioactive particles, which show a particular propensity to cling to sea water. Thus an enemy who wished to deny us the use of our great ports would in all likelihood be able to do so effectively merely by sending out at regular intervals atomic missiles which would merely have to fall within the general water area in order to create the most appalling problems of decontamination.

Thus it would seem that the most urgent tasks of all, if the sea forces of the United States and of the British Empire are to fulfil their cardinal function of projecting the might of the New or Oversea World in order to maintain and redress the balance of the Old, would be, first, the development and preparation of a vast system of mobile roadsteads, together with the corresponding preparation of a large number of emergency railheads, etc., along the coasts between which traffic could be switched as necessary to avoid presenting the enemy with a permanent, stationary target; and, second, the equipment of all merchantmen, and not merely warships with devices capable of preventing their contamination with radioactive water.

While this cardinal task of projecting the armed might of the Oversea World into the Old thus forms the ultimate and logical conclusion of the long evolution of sea power which we have endeavoured to trace, the economic pressure which loomed so large at diverse periods in that evolution is likely to play a steadily diminishing rôle in the future. Apart from all changes in technological and economic conditions, the blockade of a continental block stretching from the Atlantic to the Pacific is no longer either a readily feasible or a worthwhile proposition.

On the other hand, the functions of sea power in the conduct of the decisive military operations are definitely not going to exhaust themselves in that cardinal task of basic transport and maintenance alone. As the Second World War has shown, the expansion of the strategic scene over virtually the entire surface of the globe has created wholly new opportunities for sea power to intervene on an unprecedented scale, directly with its own naval weapons, in the crucial strategic issues themselves. The rôle of sea power in strangling the Axis lines of communication across the Mediterranean from 1941 to 1943 is an outstanding example of what sea power might again be able to effect in that same vital water barrier between

Gibraltar and Aden if the necessity should at any time arise of preventing a European surge across it into Africa. Nor are other areas lacking in various parts of the globe in which a powerful sea-air concentration might be able to exercise quite disproportionable effects both in checking a first most dangerous onslaught and in counter-attack.

CONCLUSION.

Thus systematic analysis of the possible and probable functions of sea power in a future global conflict in no way supports the overhasty conclusion that it has become completely obsolete or, at the best, after its brilliant "come-back" in the Second World War, has now passed the zenith of its power and significance and is rapidly proceeding on the downward slope. If, as I have tried to show, the global balance of power, and with it the continued peace and prosperity of the world, depends ultimately upon the ability of the sea powers to uphold their end against the rising pressure of an unprecedented concentration of land force; and if, in the last resort, their ability to hold their own in this gigantic tug-of-war depends in its turn upon their capacity to project their armed might across the intervening seas, then it is not too much to say that, as far as we can foresee at this moment, sea power more than ever before holds the key to the balance, and with it the peace of the world.

HERBERT ROSINSKI.

CHAPTER X.

THE RISE AND FALL OF JAPANESE SEA POWER.

IN 1854 Japan was a hermit nation with a feudal government, medieval army, and negligible navy. In 1894 with a small, modern fleet she defeated China in one naval campaign. In 1904 she began a successful war with Russia that made her the dominant naval power in the Far East. She entered the First World War as an ally of Great Britain and emerged with the former German possessions in the western Pacific. The collapse of the Russian armies in 1917, the surrender of the German in 1918, and the demobilisation of the British and American in 1919 left Japan with an army second only to the French. In 1921-22 the Washington Conference conceded Japan a navy second only to the British and the American, and limited the facilities and fortifications of British and American naval bases in the Far East. By the prowess of her armed forces and the shrewdness of her statesmen Japan had become the dominant naval and military power in the Far East.

Within a decade the Japanese began to expand in Asia. In 1931 they marched into Manchuria; in 1937 they invaded Central China; and in 1940 they occupied Indo-China and threatened American, British, and Dutch possessions in the western Pacific. In December 1941, after inflicting heavy losses on the U.S. fleet at Pearl Harbour, the Imperial Staff launched a land, sea, and air campaign that in three months destroyed, expelled or isolated all American, British, and Dutch forces in the Philippines, Burma, Malaya, East Indies, Andaman Islands, western New Guinea, and the Bismarck Archipelago. In another three months the Japanese fleet that made the conquests possible was decisively defeated in the battle off Midway Islands, and in 1944 it was destroyed in two major naval engagements by Admirals Spruance, Halsey, and Kinkaid. Thereafter the Commander-in-Chief, Admiral Toyoda, could only offer resistance with suicide planes and midget submarines. In August 1945 Emperor Hirohito surrendered unconditionally. Japanese sea power never extended beyond the western Pacific; its duration was brief, yet it created a powerful insular empire. Never have a navy and a nation risen so rapidly or fallen so precipitately. The events accompanying the rise and fall of the Japanese navy and empire are well known; some of the more important will be discussed in the hope that they will reveal the cause of this extraordinary phenomenon.

* * * * *

During two and one-half centuries of seclusion the population of Japan increased, the standard of living decreased, and infanticide became a common practice among the very poor. The inhabitants gleaned some information of the outside world through their own fishermen and the Dutch agents in Nagasaki. As economic conditions declined more alert Japanese began to question the wisdom of isolation. And they also learned China had been forcibly opened by the superior power of foreign ships and weapons. When Perry arrived there was a small but organised party who advocated a voluntary return to normal intercourse with

strangers. But they were all apprehensive of the foreigners. Due to these antecedent conditions Perry's short visits were sufficient not only to open Japanese ports but to release the long-confined energies of a homogeneous, seafaring, and martial people, whose leaders immediately sought to acquire the superior weapons, industries, and organisation of Europe and America.

Modern Japan began in 1867, when Mutsuhito came to the throne and accepted the resignation of Prince Togugawa, the last of the Shoguns. While still in his teens the Emperor took complete charge of the government, surrounded himself with fifty-five advisers whose average age was under thirty years, and with their counsel and assistance modernised the government and persuaded his subjects to change many of their ancient customs.* The Emperor substituted conscription for feudal military obligations, organised centralised bureaus and gave them authority to execute his ordinances and decrees. The government adopted the Gregorian calendar, established universal education, a postal service, and a national bank.

The 1870's were a decade of diplomatic and naval activity. Groups of young Japanese were sent to Europe and America to study all elements of western civilisation. A number of young naval officers (including Sub-Lieutenant H. Togo) sailed for England to commence their professional education. A mission of officers from the Royal Navy under Commander Archibald Douglas arrived in Japan to organise the Navy Department and train the fleet. The similarity of the geographical position of the British and Japanese islands appealed to the Emperor's advisers, and they had little trouble in turning the minds of their energetic, seafaring peoples toward the sea. In 1890 Mahan's first book on sea power appeared and confirmed their intention to create a navy and an insular empire. Thereafter they attempted to follow the example of the English and create an insular empire based on sea power.

The Emperor placed orders in the United Kingdom for a second-class battleship and two steam corvettes in 1871, but he did not await their completion before asserting the independence of his country and its position in the Far East. He sent a mission to Europe to negotiate the abrogation of the extra-territorial rights that had been extended to foreigners in Japan, and a naval squadron to Formosa that compelled China to relinquish its claims to the Luchu Islands and pay an indemnity for the murder of a Japanese fisherman. In 1876 he despatched a naval squadron to Korea, where its commander, following the procedure of Commodore Perry, opened Korean ports to Japanese trade.

The 1880's were a decade of political, military, and industrial progress. Marquis Ito, after touring Europe to study various governmental organisations, returned in 1885 and reorganised the cabinet, modelling it after the German. German influence was increased by the arrival in Tokyo of Major (later Major-General) Meckel, an avowed disciple of Clausewitz, at the head of an army mission to organise the War Department and train the personnel. Simultaneously steam factories, paper and textile mills were introduced. The water transportation system was improved and railways laid.

In 1889 Mutsuhito gave his loyal subjects a constitution, but its pro-

* Brinley's "History of Japan": quoted in "Forty Years of Diplomacy," by Baron Rosen (George Allen and Unwin, Ltd., London). His long service in Japan enabled Rosen to verify many of Brinley's statements.

visions did not impair the powers previously delegated in his Imperial Precepts and Ordinances,* which had equal authority with the constitution. The Imperial Diet consisted of a House of Peers and a House of Representatives. It was required to meet annually but could not sit longer than three months, and when it was not in session the Emperor could issue ordinances with the authority of laws until the Diet met. He opened and closed the Diet; he could dissolve the House of Representatives and prorogue the Diet at any time. Theoretically the Emperor exercised his legislative powers through the Diet; actually he reserved ample authority to govern by decrees.

The Emperor also retained control of foreign policy and command of the army and navy; he could declare a state of siege, of war, or conclude an armistice, make peace and negotiate treaties. He bestowed upon the War and Navy Ministers entire authority over their departments and the armed services; and to insure the professional competence of these ministers, prescribed that they must be chosen from the admirals and vice-admirals, the generals and lieutenant-generals on the active list. These ministers were required to submit their estimates through the Finance Minister to the Diet, but if the appropriations requested were reduced the Diet, under Article 12 of the Constitution, was deemed to have infringed the Imperial Prerogative. Imperial Ordinances, Precepts, and the Constitution were designed primarily to assure the nation the maximum protection against foreign aggression, and collectively they were well adapted for the purpose. Japan was one of the few Asiatic nations that escaped European domination.

The policies and programmes of Japan and China were in striking contrast. The Dowager Empress possessed the same absolute authority as Mutsuhito. The territories of the Empress had been repeatedly violated by Europeans and her suzerainty of Korea had been challenged by both Russia and Japan. She did not reform her government nor modernise her armed forces to protect her people, but depended on the diplomatic adroitness of Li Hung Chang to preserve the independence and territorial integrity of the empire by playing off one European aggressor against another. Mutsuhito modelled a new constitution and army after the German and accepted the philosophy of Clausewitz that "war is nothing but a continuation of political intercourse, with a mixture of other means." He organised his navy like the British, accepted the thesis of sea power formulated by Mahan, and prepared an army and navy of Japanese to defend the independence and promote the interests of Japan. Sino-Japanese rivalry in Korea led to war in 1894. A naval skirmish off Ping Yang and a fleet engagement off the mouth of the Yalu River were followed by the destruction of the Chinese fleet in Wei-Hai-Wei. A war of eight and a half months compelled the Empress to pay an indemnity, to recognise the independence of Korea, and cede Formosa and the Liaotung Peninsula to Japan.

Mutsuhito proved that his armed forces were superior to the Chinese. But France, Germany, and Russia all had greedy eyes on helpless China. Jealous of the entrance of Japan into the scramble for spoils, they jointly "advised" her to return Port Arthur to China and receive a larger indemnity. Japanese officials knew they could not resist the three European nations and very reluctantly accepted the advice. Soon afterwards Li Hung

* "The Armed Forces of the Pacific," W. D. Puleston (Yale Press, New Haven, Connecticut).

Chang negotiated a secret alliance with Russia and two years later leased Port Arthur and the southern part of the Liaotung Peninsula to the Czar with the privilege of constructing railways in Manchuria to connect Port Arthur, Dalny, and Darien with the Trans-Siberian Railway. Japanese indignation increased, but they did not bluster, simply increased their navy and army. In the hope that Port Arthur would satisfy the desire of Russian naval officers for an ice-free port on the Pacific, Japanese diplomats offered Russia a free hand in Manchuria in exchange for a free hand in Korea. And Baron Rosen, Russian Minister in Tokyo, aware of the growing strength of Japan and convinced that she would fight eventually rather than permit the occupation of Korean ports, recommended acceptance of the offer. Most officials in St. Petersburg did not believe Japan would risk war, so the Foreign Minister accepted with thanks Japan's acknowledgment of Russia's predominance in Manchuria, but conveniently failed to concede her a privileged position in Korea.*

The Japanese government was determined to dominate Korea and if possible to eject the Russians from Manchuria. Their armed forces were not ready, so negotiations were continued and preparation of the army and navy speeded. The constitution facilitated co-ordination of the Foreign Office and the Ministries of War and Navy. All Mutsuhito's ministers were familiar with and followed the precepts of Clausewitz and the envoys kept informed of developments in Peking and the European capitals. Army and Navy Ministers estimated the forces they would need to compel Russia to admit Japan's paramount position in Korea. The Finance Minister reckoned the cost, raised the maximum revenue the tax-gatherers could collect, and floated loans to provide the balance. Public indignation with Russia was stimulated to reconcile the tax-payers to the financial burdens, but the rate was so high that "four cabinets fell in three years"; but each succeeding government adhered to the same policy. The funds collected were economically expended, the strength of the army and navy increased, and with it the determination of the nation and the government to deal firmly with Russia.†

Some members of the Foreign Office still wished to continue negotiations with Russia in the hope of obtaining an agreement; others advocated an alliance with Great Britain and war with Russia. The issue was under discussion in the autumn of 1901 when Marquis Ito was sent to St. Petersburg to discuss Japanese-Russian relations. The Marquis of Lansdowne, who was negotiating with the ambassador in London, sent a sharp inquiry to Tokyo demanding to know if Japan really wanted an alliance. The government, compelled to make a decision, ordered Ito to London, and in January 1902 a treaty was concluded. It provided that if either Power was attacked by more than one Power, the other should come to its assistance. In all other circumstances the two Powers were to observe a strict neutrality and to do everything possible to prevent other Powers from intervening if either of them were at war.‡

The effect of the alliance was felt at once. St. Petersburg announced the gradual evacuation of Manchuria. General Kuropatkin and Count Witte both recommended the withdrawal of Russian soldiers. Kuro-

* Rosen, "Forty Years of Diplomacy."

† "The Japanese in Manchuria," Colonel E. L. V. Cordonnier (Hugh Rees, Ltd., London, 1912).

‡ "Great Britain. Empire and Commonwealth, 1886-1935," J. A. Spender (Cassell and Co., London).

patkin, responsible for protecting extended and exposed frontiers of the huge Eurasian Empire, favoured a long period of consolidation before acquiring more territory. Witte, fearful that other nations might anticipate Russian expansion in the Far East, wanted to withdraw the troops but continue the peaceful penetration of Manchuria with railways and banks, so that Russia would secure as large "a share as possible of the outlived oriental states, especially of the Chinese colossus." * Kuropatkin was supported by Baron Rosen, who was convinced that Japan would fight for Korea. A third group, that probably included Admiral Alexeief, were more ambitious and impatient than Witte. Its leaders wanted to secure the ports of Fusan and Masampho for the navy and to exploit the timber and minerals of Korea. Operations of this group in Korea confirmed the growing opinion in Tokyo that negotiations with Russia were futile.

Even with the confusion in St. Petersburg and the aid of the British alliance, on paper the military situation favoured the Czar. His navy, practically double the size of Japan's, was divided between the Baltic Sea and the Far East. Admiral Togo, chosen by Admiral Gumbrai Yamamoto, Minister of Marine, to be Commander-in-Chief of the Fleet, proposed to take full advantage of this division. But Alexeief's fleet alone numbered seven battleships and four armoured cruisers, while Togo could only muster six battleships and six armoured cruisers. To win the war Togo had to defeat both the Far East and Baltic fleets and simultaneously maintain the communications of the armies in Korea and Manchuria with Japan. So Togo in operating against the Far East fleet could not accept losses that would reduce his fleet substantially below that of the Baltic fleet. The numerical weakness of the fleet dominated Togo's strategy and definitely limited the government's objectives.

As 1903 drew to a close tension between the two nations increased. The Japanese army reported ready in the summer of 1903.† Togo took command of the fleet in August with orders to complete the preparations for war with Russia. Two small armoured cruisers, subsequently christened *Kasuga* and *Nisshin*, purchased in Italy from Argentina, reached the Suez Canal in December. These were the last reinforcements Togo could expect. Behind them steamed a small squadron under Rear Admiral Virenus destined to strengthen Admiral Alexeief's forces. Obviously Togo should strike *after* the arrival of the two cruisers and *before* Virenus could reach Port Arthur.

The Japanese war plan included a surprise attack on the fleet at Port Arthur, under cover of which army expeditionary forces would be landed in the western ports of Korea and at the mouth of the Yalu River in Manchuria. All landing places were inside the Yellow Sea and in easy striking distance of the fleet of Admiral Alexeief, who had been made viceroy and commander of all Russian forces in the Far East. If the Japanese presented an ultimatum to Russia, Alexeief would be given an excellent opportunity to attack the Japanese fleet or transports en route. He could anticipate Togo's surprise attack with one of his own. But if the Japanese attacked without a rupture of diplomatic relations they would offend neutral opinion, particularly American, which they had been carefully cultivating by posing as defenders of the integrity of Chinese and Korean territory.

* "The Memoirs of Count Witte" (William Heinemann, London).

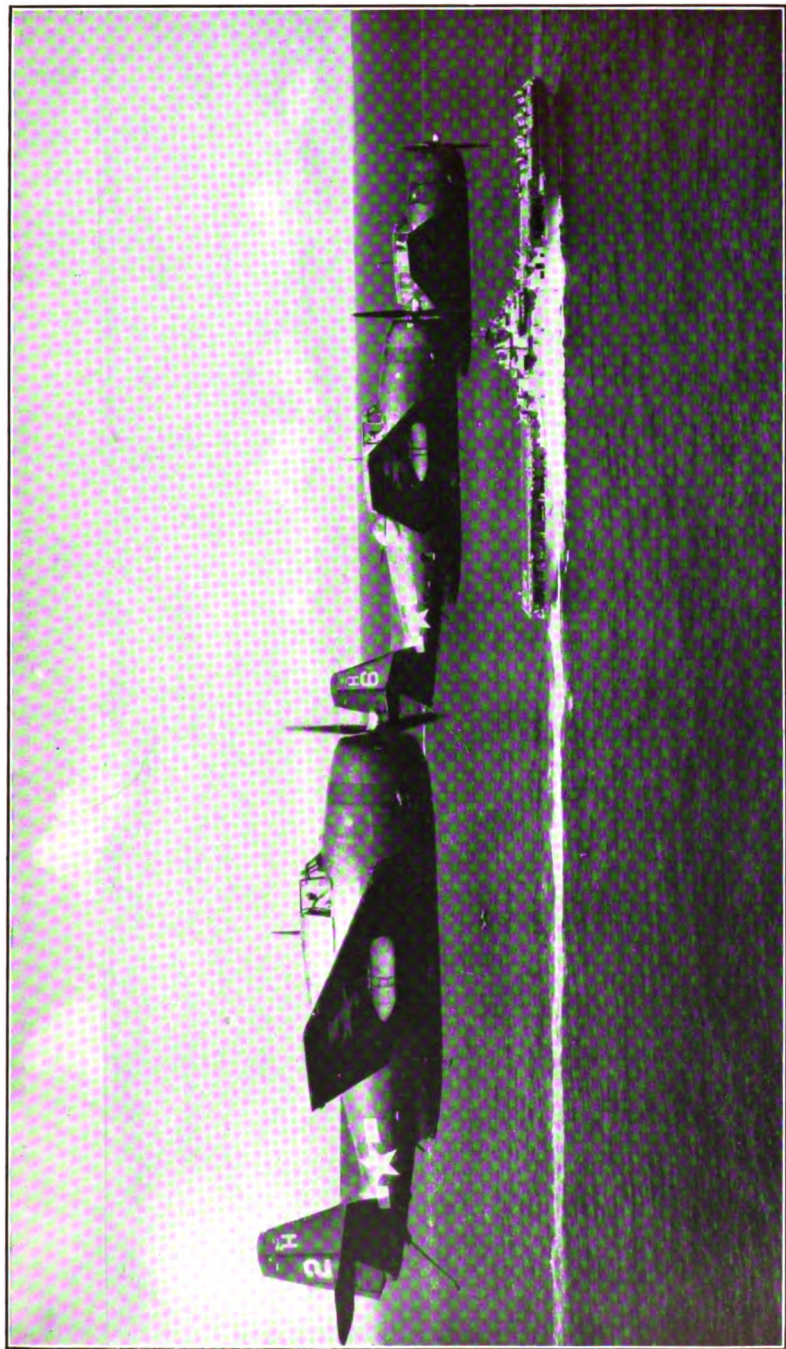
† Cordonnier, *op. cit.*

The Foreign Office met the dilemma by ordering the Ambassador at St. Petersburg to present to the Russian Government two notes simultaneously on January 13. The first, written to influence neutral opinion, stated that Japan had no alternative "than to terminate the present futile negotiations" and reserved the right "to take such action as they deemed best." This communication enabled them to assert afterwards that they had given Russia fair warning. The second note, designed to lull any apprehensions raised among Russian officials by the first, stated that Japan "having exhausted every means of conciliation—had resolved to sever the diplomatic relations with Russia"; adding "that it was the intention of the Ambassador to leave with his staff on February 10."

The majority of Russian officials, already convinced that Japan dared not go to war, were easily persuaded that Tokyo would limit its action to severing diplomatic relations. Apparently Admiral Alexeief was not alarmed by the communications. But on February 3, after exercising the fleet in day manœuvres, he anchored in the outer harbour and issued orders "to be ready for any emergency." His action was reported to Togo by intelligence agents. The *Kasuga* and *Nisshin* were then well beyond reach of the Russians, the squadron of *Virenius* had not reached Singapore. Togo's day had arrived. On February 6 he departed with the fleet from Sasebo; during the night of February 8–9 his torpedo-boats attacked the Port Arthur fleet, seriously injuring two battleships and a cruiser. On the morning of the 9th Admiral Uriu eliminated the *Varyag* and *Koryetz*, that had been carelessly left exposed in Chemulpo harbour; in the afternoon Togo followed up the torpedo attack with a very long-range bombardment of the Russian fleet with his capital ships. The prudent pattern of Admiral Togo's strategy was revealed; he knew that on his ships of the line depended control of the Sea of Japan, the Yellow Sea, and the South China Sea, and he also knew that only by controlling those seas could the war be won. He had the moral courage to avoid all unnecessary risks to those ships.

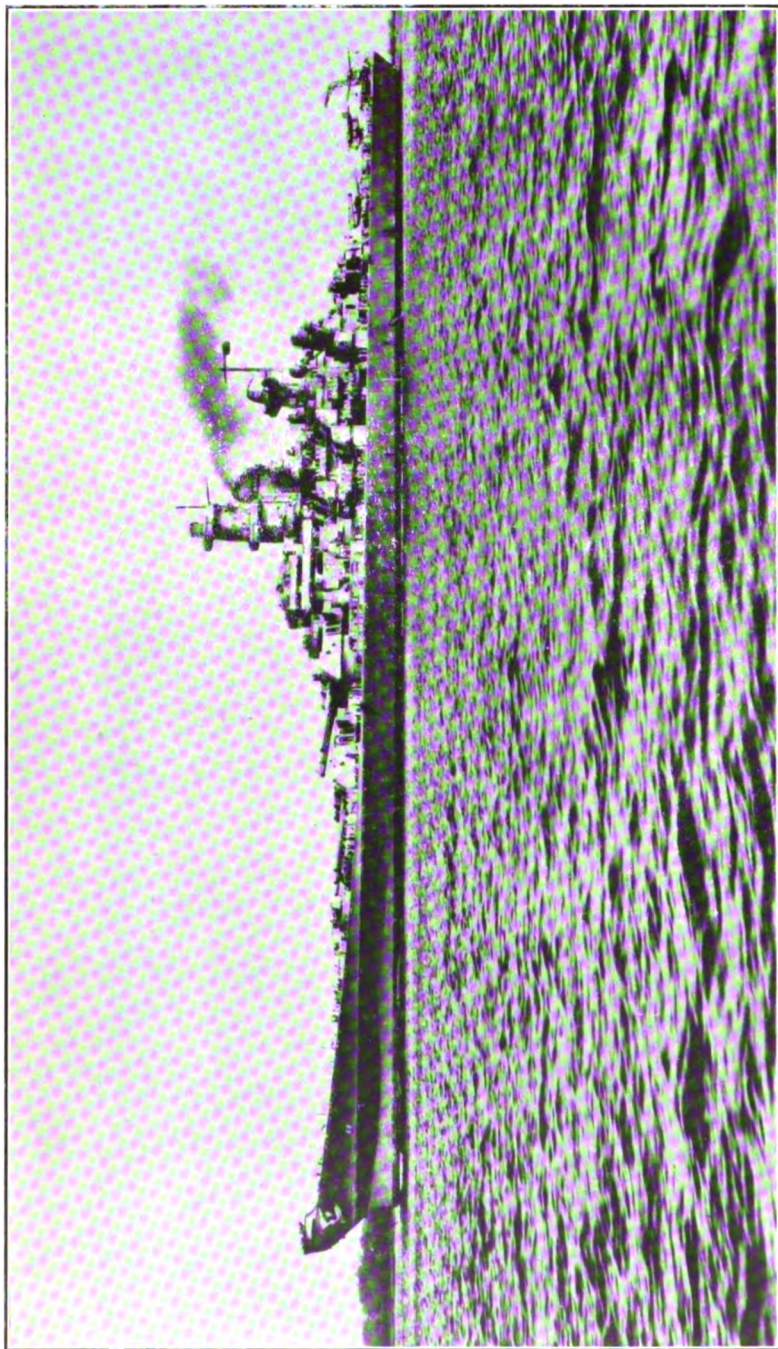
The loyal co-operation of the army, begun in peace, continued through the war. Field-Marshal Oyama, commanding the armies in Manchuria, began the hostilities before the rivers were clear of ice because he knew Togo dare not wait until reinforcements reached Alexeief. Oyama also delayed the advance in Manchuria until Port Arthur had been captured because he realised the navy needed assistance in destroying the Port Arthur fleet before Admiral Rojestvensky's fleet could arrive. During the assaults and siege of Port Arthur Field-Marshal Nogi lost more soldiers than Togo sailors. The Emperor and the Imperial Staff knew the soldiers could be replaced, but Togo had to win with the ships with which he started the war. Togo omitted no precautions; at the base he established in the Elliott Islands, sixty miles from Port Arthur, he installed an elaborate system of booms to protect his ships from enemy torpedo-boats, and he kept enemy ships at Port Arthur under observation by intelligence agents and small craft. On the other hand he was unmoved when he lost two battleships and had another seriously injured by mines in a single day; he adhered to the plan to keep a close watch over Port Arthur until its fleet was destroyed.

After the partial victory of August 10, Togo contented himself with driving the remnants of the defeated Russian fleet back into Port Arthur. The temptation to pursue and probably destroy the Russian ships was undoubtedly tremendous, but if he had annihilated the Port Arthur fleet



U.S.S. Randolph with Grumman " Avengers " in Flight.

(Official U.S. Navy photograph. By courtesy of Navy Department.)



U.S. Battleship Wisconsin.

(Official U.S. Navy photograph. By courtesy of Navy Department.)

and reduced his fleet substantially below that of Rojestvensky he would have jeopardised the war. After the surrender of Port Arthur and its fleet he hastened to Japan to repair and refit his ships. He then proceeded to an isolated harbour in north-eastern Korea, where his fleet could not be easily located, and completed the final plans and preparations to attack Rojestvensky. Not until he had positive information of the position of the Russian fleet did he launch his ships at the enemy. Even then he manœuvred to gain an initial tactical advantage that enabled him to annihilate the last Russian fleet with negligible losses in the battle of the Sea of Japan. Togo's operations are a model for any admiral required to wage a limited naval war with a numerically inferior fleet.

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Japan, then opposing Russia's designs on Manchuria and Korea, welcomed the reappearance of the United States in the Far East after Dewey's victory in Manila Bay. For a time she supported the policy of the open door in China, but she had not entirely abandoned her hopes of acquiring the Hawaiian Islands and opposed their annexation by the United States. After the defeat of Russia the government vigorously protested at the exclusion of Japanese subjects from the United States. President Theodore Roosevelt patiently explained to their envoys that economic conditions made exclusion imperative, but not until he sent the U.S. Fleet to the Pacific did the tension abate.

Other causes of friction arose. The annexation of Korea created American indignation. Japan no longer pretended interest in the open-door policy; and when Secretary of State P. C. Knox proposed that the Chinese Eastern Railway be neutralised, the former enemies, Russia and Japan, quickly settled their differences and concluded a secret treaty to protect their treaty rights in Manchuria. Friction between Japan and the United States was so obvious by 1911 that the British Foreign Office in renewing the alliance with Japan inserted a clause that neither nation was obliged to make war on another nation with which it had a general arbitration treaty. This reservation, designed to remove American apprehensions, was not entirely successful.

In 1912 Emperor Mutsuhito died, his son and successor lacked his father's ability to control the army and navy and to adjust the national policies to the nation's strength. Two years later the war in Europe began and gave Japan an opportunity to expand unrestrained by any European power. She entered the war nominally as an ally of Great Britain, but her operations were conducted to secure her own objectives. She did assist somewhat by controlling the western Pacific, but only incidental to her own plans. After the capture of Shantung and Germany's Pacific islands, Japanese participation in the war cost her little. Her government and industrialists combined to make the most of the war. Profits reaped from the necessities of her allies financed the modernisation of her heavy industry, increased her merchant marine, and enabled her to displace European nations in China's markets. In 1915 Japan made twenty-one demands on China that would have made the new republic a vassal state. Washington intervened on behalf of China and increased the latent friction with Tokyo, which was not allayed when the United States entered the war against Germany.

Despite Japan's demands on China and her attempts to take advantage of the Russian Revolution to seize territory in Siberia, she was invited to

the naval conference in Washington in 1921-22 and conceded a navy second only to the British and American and practically double the size of the French. This concession was made when Japan possessed an army second only to the French. Since the reign of Charles V no European nation except France under Louis XIV and Germany under William II had attempted to maintain simultaneously such a formidable army and navy in time of peace. In addition, with the consent of the Right Honourable Arthur Balfour and the Honourable Charles E. Hughes, facilities and fortifications of British and American naval bases in the western Pacific were fixed. This decision made it increasingly difficult for either navy to operate against Japan in the western Pacific. Balfour and Hughes desired to allay alleged apprehensions of Admiral Baron Kato that Japan might be attacked by either the British or American fleet. They relieved Japan's apprehensions, but removed at the same time all restraint on the Japanese armed forces, and in 1931 the army marched into Manchuria, five years before Mussolini invaded Ethiopia and two years before Hitler attained power in Germany.

In 1934 the Japanese Government denounced all limitations on her navy and a year later announced her intention of withdrawing from the League of Nations. Four months later Hitler took the Reich out of the League. In 1937 the arrogance of the Japanese army reached a temporary peak. After invading Central China its planes turned machine-guns on the British Ambassador to China and sank the U.S.S. Panay. Japan inspired other ambitious nations, and during the next two years Hitler over-ran Austria, Czechoslovakia, and Poland. Appeasing aggressors began in the Far East.

The American Government accepted the flimsy excuses offered by Japan for sinking the Panay and the injuries done to its citizens in China, but the State Department increased its diplomatic and economic support of Chiang Kai Shek, who continued to resist the Japanese advance into Free China. When the European war began in Poland and opportunity beckoned a second time, the Japanese army was fully occupied in China, while the Hitler-Stalin non-aggression pact made it necessary to maintain Japanese armies along the Russian frontier. When western Europe was over-run by Hitler, Japan invaded French Indo-China. The United States immediately protested and increased its assistance to Chiang. A second time the United States stood between Japan and domination of China ; and in addition control of the oil, rubber, tin, and rice of Indo-China, Malaya, and the East Indies. Tension between Japan and the United States mounted, and when Ambassador Horinouchi left Washington in December, 1940, he reported to the Secretary of State that never in his memory had Japanese-American relations been so strained.

The Senior Flag Officers of the Japanese navy realised the grave dangers to Japan of a war with the U.S. navy supported by the Royal Navy. A group of them joined the Foreign Minister in urging Admiral Nomura to take the ambassadorial post at Washington and reach an agreement if possible. Simultaneously Admiral Nagano, Chief of the Naval Staff, directed Admiral I. Yamamoto, Commander-in-Chief of the Combined Fleet, to prepare a plan of campaign in case negotiations failed.

Undoubtedly the Japanese navy preferred peace, and Nomura sought to find a formula that would avert war without restoring the conquests made by the army in China, for he knew that the government would not abandon territory that had cost the tax-payers money and the soldiers so

many lives. The United States would not desert Chiang after urging him to resist. In July the President froze Japanese assets in the United States ; and in August, after a conference with Prime Minister Churchill, he informed Nomura, in person, that if Japan took further steps to dominate neighbouring countries by force, the United States would be compelled to take immediately "any and all" steps to safeguard American interests and the security of the United States. This language closely resembled that used by Japan to Russia in January 1904. Nomura accepted the statement as a warning that the United States would go to war if the advance in Indo-China continued even if the Japanese avoided collision with British forces.

While negotiations proceeded in Washington and Tokyo, the advance into Indo-China continued and it was accompanied by bellicose statements of Tokyo officials that raised doubts among Americans of Japan's sincerity. Promises of the American administration to assist all nations resisting the Axis powers and speeches by officials in the United States caused suspicion of American good faith in Tokyo. In the note of November 20 Nomura presented Japan's maximum concession, an offer to withdraw troops from the south to the north of Indo-China and when peace with China was established to withdraw from Indo-China. Replying on November 26, Mr. Hull demanded the withdrawal of all Japanese "military, naval, air, and police forces from *China and Indo-China*" (italics are mine). Admiral Nomura and his assistant, Ambassador Kurusu, both realised that their government would not accept such conditions. They inquired if Mr. Hull was interested in a temporary *modus vivendi*. When Hull indicated his lack of interest they asked to see the President. When Mr. Roosevelt confirmed the reply of his Secretary of State, Nomura realised war was inevitable. So did Mr. Hull, and he informed the British Ambassador that the problem was now in the hands of the military.

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When Nomura in August reported President Roosevelt's determination to "take any and all steps" to protect American interests, Admiral Yamamoto was in the midst of his preparations for the initial offensive. He had despatched the task force, destined to attack the fleet at Pearl Harbour to Hitokappu Bay for final rehearsals, the 11th Air Fleet, the navy's finest land-based air force, already assigned the task of destroying British and American air forces in the western Pacific preparatory to attacking their naval forces, was rehearsing from its bases in Indo-China and Formosa. The Second Fleet, with small carriers, battleships, cruisers, destroyers, and submarines, prepared to escort and support the invasion forces being assembled in Japan, Formosa, and Indo-China to occupy the Southern Resources Area. Admiral Yamamoto retained the most powerful battleships, with some cruisers, destroyers, and small carriers, under his immediate command in the Inland Sea to maintain cohesion between the forces he proposed to deploy from Honolulu to Singapore.

Admiral Yamamoto was a colourful but, during the first three months, a prudent commander-in-chief. And despite the defeat at Midway and the reverses at the Solomons he retained the confidence of the nation, the navy, and his immediate senior, Admiral Nagano, to the end. Nagano accepted Yamamoto's recommendations to extend the original perimeter of their conquests although he and his staff questioned the wisdom of the extension. After Yamamoto's death Nagano chose Admiral Koga to be commander-in-chief, but according to Admiral Fukudome, who was Koga's

chief-of-staff, Yamamoto was pre-eminent. Fukudome said "there was only one Yamamoto." It is probable that Admirals Yamamoto, Koga, and Toyoda, who commanded the Combined Fleet in the order named, were the flag officers best qualified to command the fleet. Fukudome, who knew them all, rated them in that order; and by choosing first Yamamoto and then Koga to command the fleet, Admiral Nagano confirmed Fukudome's judgment.

The Imperial General Staff assigned the navy two tasks: to destroy American, British, and Dutch air and naval forces in the Pacific and to support the army in occupying the Southern Resources Area. Yamamoto was allowed a free hand in developing and executing the naval operations. His plan for the first campaign was sound, simple, and easy to understand. As Togo profited by the division of the Russian Fleet he took full advantage of the division of the American Fleet; like Togo, he enjoyed the full co-operation of the Foreign Office, which prolonged the negotiations in Washington until he was ready to strike the fleet in Pearl Harbour. He planned to destroy or neutralise the American Fleet at Pearl Harbour long enough to permit the destruction of American, British, and Dutch armed forces in the western Pacific, and the occupation by the army of the Southern Resources Area and certain strategic areas to defend them. The second phase of the war was to be defensive. In the strategic areas durable bases for the fleet with its air forces would be established and fortified. In the third phase naval and air forces operating from these "durable" bases would intercept and destroy any enemy force that attempted to enter the western Pacific. During all phases every opportunity would be embraced to destroy enemy armed forces.

The plan included extensive territorial objectives, but, throughout, it embodied Yamamoto's determination to destroy the naval and air forces of the enemy nations and thus weaken their will to continue the war. Admiral Koga, Yamamoto's successor, also emphasised the necessity of striking at the American fleet; his original intention was to bring on a naval engagement in an area where his land-based planes could compensate for American superiority in surface ships and carrier planes. But neither Yamamoto nor Koga could resist the appeals of local army and navy commanders to send reinforcements from the fleet to assist in the defence of various unessential areas, and they frittered away the fleet in attempting to hold islands originally taken to act as barriers against the American fleet. Instead of adhering to their plan to reduce the American fleet by attrition to the point where it could be attacked, they allowed their fleet to be worn down by minor attacks. The original Japanese plan would not have succeeded, because American industry provided ample replacements of the ships lost; but adherence to it would have prolonged the war and offered the best opportunity to win.

The plans and operations of Yamamoto in his first campaign left little to be desired. His combined Fleet included land and carrier-based planes; his surface, subsurface, and air ships had operated together in time of peace. He had been given ten months to prepare them for a particular task. The American administration conceded him the initiative and he chose the times and places to attack. His well-trained forces carried out his plans practically on schedule and with negligible losses. Togo's initial successes in 1904 were small compared with the blows dealt by Yamamoto, who in three months destroyed the American, British, and Dutch forces that opposed his advance and occupied territories that vastly

stronger American, British, and Dutch Forces required three years to recover. Only time and space could absorb the initial blows of Yamamoto, and only a better-led American fleet, with its own integrated air force, could halt its advance.

The strategical decisions of Yamamoto after his first three months campaign will not compare with those of Togo. Yamamoto's problem was more difficult ; he was opposed by Admirals King, Nimitz, Spruance, and Halsey, while Togo's only energetic opponent, Admiral Makaroff, was killed in his first action. The American admirals were supported by an immense industry. King had to combat the German U-boats as well as the Japanese fleet, but he knew that he would have almost unlimited naval resources at his disposal. Yamamoto's only chance of eventual victory was precipitate action by King. But until the victory at Midway, King's strategy was very conservative. Subsequently he invaded the Solomons and thereafter never relaxed the pressure on Yamamoto and his successors. Each American victory made succeeding victories easier and Japan's defeat more certain.

Granting that Togo's task was easier than Yamamoto's, it still must be said that he would not have made the errors committed by "victory-drunk" Yamamoto. Togo would not have mistaken the battle of Coral Sea for a victory ; he would not have undertaken to capture Midway and bases in the Aleutians simultaneously. Togo would never have employed the whole fleet to defend the Solomons, for fear of losing prestige, and brought on a series of desperate battles over 2,000 miles from adequate repair bases. Togo allowed neither victories nor defeats to disturb his judgment nor change a carefully determined course of action. Yamamoto, after revealing an acute appreciation of the tactical values of surface, sub-surface, and air ships and patiently training his officers and men for battle and winning an astounding series of victories, suddenly departed from his overall strategy and involved his fleet in unnecessary risks, and left to Admiral Koga a hopeless strategic position.

Togo was supported at every crisis by Field-Marshal Oyama and Nogi ; Yamamoto's army colleagues were continental soldiers whose hearts were in Asia. They forgot that their armies were raised and trained to serve an insular empire. They had never had their sea communications threatened ; apparently they knew nothing of sea power. They insisted that Yamamoto, Koga, and Toyoda use navy ships and planes to protect islands that had been originally taken to act as temporary support for the navy in a war of attrition. And when their garrisons were by-passed they demanded that submarines be diverted from combat duty with the fleet to supply their beleaguered troops. Engrossed in Asia, they had not completed the defences of Saipan when Spruance took the island, and left Truk, the navy's central base, to be garrisoned by sailors. After MacArthur had reached western New Guinea, Spruance had taken the Marianas and Halsey, Mitscher, and McCain were preparing the Philippines for invasion, some highly placed army official still expected the main American blow to fall on Singapore. Not until Okinawa was taken did the Japanese army realise that their empire was threatened from the sea and transfer planes from Manchuria for the defence of the Home Islands.

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The reasons for the phenomenal rise of Japanese sea-power are obvious. The position of the Japanese islands gave their navy the same strategic

advantage in the western Pacific enjoyed by the Royal Navy in the eastern Atlantic. The people were courageous, seafaring, and patriotic ; officers of the navy and army were brave and competent ; their statesmen worked harmoniously with the admirals and generals ; and Emperor Mutsuhito administered the autocratic government frugally, efficiently, and with real regard for the welfare of the nation. The Emperor, government, and people were united in their determination to resist foreign domination and to expand in order to improve economic conditions at home. To attain these objectives, under the Emperor, the admirals and generals created a navy and an army sufficient to assist the navy in gaining control of the adjacent seas and the mouths of the great rivers emptying into these seas. Their statesmen adjusted the national policies to the existing industrial and military capacity of the nation. Before attacking Russia in 1904, their diplomats negotiated an alliance with Great Britain and temporarily composed their differences with the United States. By defeating Russia Japan became the preponderant sea power in the western Pacific and therefore the dominant military and political factor in the Far East.

Japanese sea power was limited to the western Pacific and lasted only forty years. In its brief existence it produced Admiral Togo, who thoroughly understood the powers and limitations of regional control of the sea, and Admiral Yamamoto, who brilliantly demonstrated in his opening campaign the overwhelming power of control of the sea and of the air over the sea. The rapid assimilation by Japanese naval officers and senior army officers of the teachings of Mahan and their application to their own policies is unprecedented. And the acceptance of diplomats and military officials of Clausewitz's theory that war is a continuation of political intercourse with a mixture of other means gave coherence to policy and national strategy that has been conspicuously absent from the conduct of British and American foreign affairs.

What caused the eclipse of the Japanese navy and the downfall of the empire it had created ? This brief survey has revealed various contributory causes, but they all can be traced to the determination of the army to make Japan a continental as well as an insular empire. The truculence of the officers and the brutality of the men added unnecessarily to their enemies, but if they had behaved with moderation Japan could not have simultaneously supported a navy and army essential for a great sea and land power. Like Japan, Great Britain and the United States are natural sea powers. All threats to the United States, the United Kingdom, the Dominion and Colonies overseas (with the possible exception of India) must come across the sea, under the sea, or through the air, and these threats can best be met by superiority in surface, subsurface, and air ships. And both British and American governments, that are habitually unprepared for war and regularly wait for the enemy to strike the first blow, should realise now that in the atomic era it may be impossible to recover from a surprise attack. They should depend on ships and planes to protect their own security and interests overseas and to make their contributions to world peace through the United Nations ; and they should keep these forces ready to act before a potential aggressor can strike.

W. D. PULESTON.

CHAPTER XI.

INTER-ALLIED NAVAL CO-OPERATION IN THE WAR.

"We must regard the struggle at sea as the foundation of all the efforts of the United Nations." (Mr. Winston Churchill, November 11, 1942.)

THE following account of inter-allied naval co-operation in the war deals with the British Navy on the one hand and on the other the naval forces of the occupied countries of Europe—France, Poland, Norway, Holland, Belgium, Denmark, Greece, and Yugoslavia. If any excuse is needed to justify the omission of the U.S.A. from an account of allied naval co-operation in the war it is that any adequate description of American co-operation would need a chapter to itself.

ANGLO-FRENCH CO-OPERATION—THE OPENING PHASE.

The first intimation that the British and French Governments had in fact had prior consultations on matters relating to the conduct of the war was afforded by the issue, on the day that war was declared, of a joint Anglo-French statement setting out certain general principles which would govern the operations of their armed forces. In operations against merchant shipping the two Governments affirmed their intention to abide by the Submarine Protocol of 1936 and to employ aircraft in conformity with the recognised rules applicable to the exercise of belligerent rights by warships. In the event of Germany failing to observe these restrictions the two Governments reserved their right to take such action as they deemed appropriate.*

Co-ordination in the higher direction of the war was provided through a Supreme War Council, the first meeting of which took place in Paris on September 12, 1939, and was attended by the two Prime Ministers. The Council subsequently met at intervals in Paris or London, and it may be noted here, though rather in advance of events, that at its meetings in Paris during the week April 22–27 (shortly after the invasion of Norway) representatives of Norway and Poland were present (Polish troops took part in the allied expedition to Norway).

The first formal Allied Naval Conference of the war took place in Paris from November 2 to 5, in order, in the words of the official statement issued afterwards "to discuss the work of the British and French Navies who are carrying out their joint tasks in active co-operation." The conference was attended by the First Lord of the Admiralty and the French Minister of Marine each accompanied by Staff Officers. It was later revealed that Anglo-French co-operation had been planned before the war and that much had been done to facilitate the smooth working of the system should the necessity arise. Plans were ready to be put into execution. In Home Waters the French had assumed control of certain patrol zones and were actively engaged in anti-submarine measures. Joint measures for the protection of convoys were in force. French forces too

* It will be recalled that on the second night of the war the S.S. *Athenia*, with some 1,400 passengers on board, was torpedoed without warning, 200 miles west of the Hebrides.

were concerned in circumscribing the activities of German surface raiders. In the Mediterranean the western basin had become a French responsibility and during the comparative lull that ensued, after an initial period of uncertainty, before Italy declared war (June 10, 1940) frequent Allied conferences were held at Malta and Bizerta to concert plans for the future.

It may be of interest to compare these arrangements with those made in 1914. Under the terms of a Convention dated August 6, 1914, command in the Mediterranean was to be left in French hands. When the German battle cruiser Goeben and her consort the Dresden were disposed of British armoured ships would be withdrawn and the remainder were to be placed under the orders of the French Commander-in-Chief. In other areas the British Admiralty was to have the general direction of naval operations, French ships in the various areas being placed under the orders of the British Admiral commanding the station. The foregoing arrangements suggest a higher degree of "integration" than was contemplated in 1939.

But to return to World War II, an operation that undoubtedly had been the subject of the closest prior co-ordination and joint planning was the transport of the B.E.F. to France. That British soldiers had arrived in France was disclosed as early as September 11, and precisely one month later the Secretary of State for War announced that during the previous five weeks 158,000 men and 25,000 vehicles had been transported to France without the loss of a single man or vehicle. On the other hand, the joint allied Expedition to Norway in April, 1940, was clearly an operation which had not been long foreseen or previously planned (*vide* statement by the Prime Minister quoted later under the heading "Norwegian Navy"). The expedition probably had its inception at a meeting of the Supreme War Council in London on April 10 at which the situation resulting from the German invasion of Norway was discussed and after which a statement that the Allies would render full aid was issued. The first British troops landed at Andalsnes on April 14.

An operation that was even more extempore was the rescue of the B.E.F. from Dunkirk. The main features of this operation are well known. For the present purpose it will suffice to record that the French Admiral at Dunkirk worked throughout in excellent co-operation with the Senior British Naval Officer there and that of the 23 French warships, chiefly destroyers, that took part in the withdrawal three were lost; a proportion which corresponds very closely to the British loss of six out of 41.

On June 22, 1940, 18 days after the completion of the withdrawal from Dunkirk, the Franco-German armistice was signed and the first phase of Anglo-French naval co-operation came to an end.

THE GERMAN INVASIONS AND SUBSEQUENT DEVELOPMENTS.

The situation so far described has been that of two national forces working in planned co-operation from their own or each other's bases. The situation that was created by the successive invasions by the enemy of the various countries of Europe, which brought new allies into being, was of course quite different and indeed unprecedented. For the most part such co-operation as existed was improvised and extempore.

Though the German invasions were spread over a considerable period of time (Poland was invaded on September 1, 1939, Yugoslavia on April 6, 1941) and the situations that resulted were not identical in the occupied countries, yet geography, and the general circumstances of the war at the

time, made it inevitable that such of the ships of the national forces as were able to escape should find refuge in British bases. In general terms the situation thus created and the task that the several allies had to face were as follows : for Poland, Norway, Greece, and Yugoslavia it was to reconstitute a naval force with a nucleus of those ships that had escaped ; for Holland much the same, though with the important difference that the major part of the Royal Netherlands Navy was still in being in the Far East ; Belgium did not possess a navy, but determined to contribute to the best of her ability. The Governments of these countries had found refuge in the United Kingdom. The Free French movement was on a very different footing ; a number of French warships had sought refuge in British harbours, but the movement was essentially on a voluntary basis and the men who set about creating the Free French navy did so in defiance of their Government and in opposition to the views of the majority of their comrades. Denmark was not technically an " ally " ; the Royal Danish Navy was in its home ports and the present account relates to the Free Danes.

It was perhaps the realisation, possibly unconscious, of the significance of the struggle at sea, later so succinctly expressed by Mr. Churchill in the quotation which heads this article, that inspired the Allies to continue it in the difficult and disheartening circumstances of 1940-41. Situated as they were it was natural that our allies should rely, in the first place, on British help and resources for reconstituting a naval force, whether by repair and modernisation of their damaged ships or by the provision of others. It followed, too, that it was under British direction and control that those forces actively participated in the wide-spread operations of the war at sea. The administration of the various national forces remained, however, in the hands of their own national authorities. When the U.S.A. became the " arsenal of democracy " the Allies shared in the material made available under the provisions of Lease-Lend, but if material was transferred to them it was at first through British agency. As the war developed direct contacts and arrangements between the U.S. authorities and these several allies became increasingly frequent ; repair work and modernisation was carried out in American yards ; and in various theatres of war ships of these Allies operated with British and American forces under the same operational control and under the arrangements that had been instituted for the Supreme and Higher Commands. An earlier and perhaps not so generally remembered example of an integrated allied force is mentioned later in the section dealing with the Dutch navy.

Two transfers of ships by the United States may be mentioned as being outside the run of normal transactions, namely the presentation in 1942 of submarine chasers to the Norwegian and Dutch navies as a special tribute from the American people. The ships, PC 467 and PC 468, were named respectively King Haakon VII and Queen Wilhelmina.

Though Britain and the United States could supply the allies with ships it was on their own " sources of supply " that they had to rely for the men to man them and to make good wastage due to battle casualties and sickness. For most of them the man-power problem was very difficult. Their countries were in enemy occupation and for such of their scattered nationals that they could collect there were the competing claims of their army, air force, and merchant navy to be considered. Circumstances varied, but one " source of supply " was common to all, that is the men who managed by many and devious routes and at considerable risk to

escape to British territory. But having secured the ships and the men to man them, there was still the problem of training, and this too was difficult, for not all of the recruits were sailors such as naval reservists, merchant seamen, or fishermen. The situation was not without difficulties for Britain as well as for the Allies. One of the fundamental and early measures that had to be taken was the passing on August 21, 1940, of the Allied Forces Act which legalised the formation and training of allied forces on British soil under their own military discipline.

THE INDIVIDUAL NAVIES.

THE POLISH NAVY.

In August, 1939, the Polish Navy comprised four destroyers—of which the *Blyskawica* and *Grom* were large, fast modern ships—five submarines, one torpedo boat, and other small vessels of various types. Compared with the German forces available the odds were overwhelming. In the event of war the Polish Navy, or at least the surface ships, could hardly survive and the extent to which it might be able to affect the ultimate issue was very limited. Two days before the outbreak of war the *Blyskawica*, *Grom*, and *Burza* (the next most modern destroyer) sailed under sealed orders for the United Kingdom. The Polish Navy was thus deprived of its three most powerful ships on the eve of war. It must have been a difficult and painful decision; it has not inaccurately been described as heroic, but in the light of after events it cannot be doubted that it was justified. The meeting of the Polish destroyers with the British destroyer which led them to the Firth of Forth on September 1, 1939, is commemorated by a silver plaque depicting the scene which was presented by the Polish Navy to the First Sea Lord on the fourth anniversary of the occasion and stands to-day in his room at the Admiralty.

For some time the submarines maintained the struggle under the difficult conditions imposed by the shallow waters of the Baltic and the constant menace of air attack. There was no base of their own to which they could return for fuel and repairs. Eventually three of them were forced to make for Sweden, where they were interned, but two, the *Wilk* and *Orzel*, managed, separately, to reach this country. The story of their escape from the Baltic has been described as "one of the greatest epic adventures in the whole story of submarine operations."

To continue the fight in co-operation with the Royal Navy there were thus three destroyers and two submarines. By 1944 the Polish Navy had been expanded, in spite of losses, to one cruiser, six destroyers, of which three were of the "Hunt" type, two submarines and a flotilla of light craft (M.G.Bs. and M.T.Bs.), with a strength of nearly 8,000 officers and men. It was a proud day for the Polish Navy when the *Dragon* was handed over to them, the first cruiser they had possessed and, it may be remarked, the only British cruiser to be lent to an allied navy during the war. She was damaged in operations in connection with the landing in Normandy and was afterwards sunk to form part of the breakwater off the coast. Other losses during the war comprised three destroyers, including the *Grom* at Narvik—a sad blow for the Polish Navy—and two submarines, one being the gallant *Orzel* the other the *Jastrzab* (ex-American).

The full list of operations in which the Polish destroyers took part would be a long one—Narvik, Dunkirk, the raid on the Lofoten Islands (1941) and at Dieppe (1942), the sinking of the *Bismarck*, the landings in

North Africa, Sicily, and Italy, Normandy and the south coast of France. In fact, there were few major operations in Home Waters and the Mediterranean in which the Polish Navy was not represented. They had, too, their share of convoy escort work, the Murmansk convoys, in the Channel, the Battle of the Atlantic, and the Malta convoys in the Mediterranean. With such comparatively small numbers it was a remarkable record. The services of the submarines was equally distinguished both in northern waters and in the Mediterranean, where their operations were said by the First Lord early in 1944 to have been particularly successful. The light forces were frequently mentioned in the engagements of coastal forces in the Channel and southern part of the North Sea.

In the course of its long history the British Navy had worked in conjunction with many navies, but in 1939 the Polish Navy was for most an unknown quantity. First impressions were very favourable. After their arrival in the United Kingdom the Polish destroyers were sent to Plymouth, and the Commander-in-Chief remarked that when "Action Stations" were exercised during the course of his visit the men did not double to their stations, they flew. Subsequent events confirmed this view. In the course of the war many tributes were paid by British senior officers to the fighting efficiency and ardent spirit of the Polish ships operating under their command. The remarkable eyesight that the Poles seem to possess and the excellent look-out that their ships kept was frequently commented on by British officers, as was the efficiency of their anti-aircraft fire, to which no doubt the foregoing characteristics contributed. (The *Slazak*, a Polish "Hunt" type destroyer, was credited with no less than four aircraft brought down and two damaged during the Dieppe raid, and at the end of the year was bracketed first with a British destroyer in the list of aircraft destroyed by the allied navies in 1942.) It may be recalled, too, that when the destroyer flotilla was sent in to attack the *Bismarck* on the night before she was sunk, the Polish destroyer *Piorun* was the first ship to sight her.

The following signal made by the Commander-in-Chief Mediterranean on a certain occasion serves to epitomise the feelings of the Royal Navy towards their Polish colleagues :

"[Force H] is proud to have a unit of the Polish Navy to fight with them and to serve in such good company."

THE ROYAL NORWEGIAN NAVY.

The Germans invaded Norway on the night April 8/9, 1940. Although, as the British Prime Minister stated later in the House of Commons, there had been indications in the Baltic for some time that an expedition was being prepared, we did not know its objective and "Denmark and Norway, believing their neutrality would save them, took no precautions and gave us no warning of an attack, which indeed they never suspected."

The Norwegian Navy at the time comprised two coast defence ships, with 8.2-inch and 5.9-inch guns but nearly forty years old, seven small destroyers, of which four were modern, nine submarines of obsolescent types, a modern minelayer and a fishery protection vessel, together with a considerable number of small craft—old torpedo boats, patrol boats, minesweepers and various auxiliaries.

During the early hours on April 9 the Germans struck in force at six of the principal ports from Oslofjord in the south-east to Narvik in the far

north. The operation was well planned and various ruses were successfully employed in the uncertainty that existed. Surprised and confused though they were, the small Norwegian naval forces and the shore defences struck back, inflicting considerable loss. The German 8-inch cruiser *Blücher* and the *Brummer* were sunk, the *Deutschland* and three of the smaller cruisers were damaged; of the destroyers one large and three smaller were sunk and others damaged. Various small craft, troop transports and supply ships were also sunk or damaged.

Help from the British Navy was soon forthcoming, and it may also be recalled that a German troop transport (*Rio de Janeiro*) had been sunk off the Norwegian coast on April 8 by the Polish submarine *Orzel*. In the south, the cruiser *Karlsruhe*, returning damaged from Kristiansand, was sunk by a British submarine and the cruiser *Königsberg*, lying damaged at Bergen, was bombed and sunk by the Fleet Air Arm. In the north the German destroyers at Narvik were destroyed in the first and second Battles of Narvik. The invasion was successful, but the German losses at sea were serious.

The history of the joint Allied Expeditions to Norway, which included Polish as well as French troops, cannot be told here; during this period the surviving ships of the Norwegian Navy, with their naval air arm, maintained a guerilla warfare in the fjords, where British forces were also operating, but few survived. It was in H.M.S. *Glasgow* on April 29 that H.M. The King of Norway left Molde for the north, and it was in H.M.S. *Devonshire* that he sailed from Tromsø on June 7 for the United Kingdom.

Only thirteen ships of the Norwegian Navy and one submarine escaped to this country. Of these the *Sleipner* (a small modern destroyer) was employed on escort duty with coastal convoys and it is of interest that while so engaged the exploits in the Norwegian fjords attributed to her by the people there became a legend, and they called her "The Devil of the North Sea." Of the other ships that had escaped many, such as the fishery protection vessel *Fridtjof Nansen*, the patrol vessel *Nordkapp*, and various auxiliaries, were able to render useful service in meeting the many and varied requirements of modern war; but it was in the ships transferred from British or American sources that the Norwegian Navy made its most conspicuous contribution to the prosecution of the war.

The first ships to be lent were four of the fifty American destroyers that had been transferred to Great Britain in September, 1940. (One of the original four was sunk and replaced by another.) They were followed in 1941/42 by five British corvettes. In the vital Battle of the Atlantic both these destroyers and the corvettes rendered valuable service, operating for the most part with British escort groups but also for a time with an American group. It was work in which their high standard of seamanship found full expression. In the often long-drawn battles with the U-boat wolf packs in 1942 the Norwegian corvettes played a distinguished part and one of them was sunk with heavy loss of life.

In the course of time the ex-American destroyers were replaced by modern counterparts, of which the British "Hunts" *Eskdale* and *Glaisdale* were the first. For the most part they were employed with their British sisters in escorting our own coastal convoys or attacking those of the enemy. After a comparatively short period of service the *Eskdale* was torpedoed and sunk in an action with E-boats; the *Glaisdale* continued the good work—she completed her 150th convoy escort in February, 1944. The *Eskdale* was replaced by a new British fleet destroyer (*Stord*) followed later

by a second of the same class (Svenner). They operated with the Home Fleet and in December, 1943, the Stord was commended for her services in the action in which the battle cruiser Scharnhorst was sunk. The Svenner was sunk on D-day at the Normandy landings, and in her place another of the "Hunts" (Arendal) was manned.

The first submarine to be lent to the Norwegian Navy was named the Uredd (ex-British U-class). After successful service in the north she was lost on patrol; her tradition was worthily carried on by the Ula and Utsira of the same type.

In 1939 there were under construction in the United Kingdom to the order of the Norwegian Government a flotilla of M.T.Bs.; two of these were manned by the Norwegians in May, 1940, others were added later; and they operated with their British, Polish, and Dutch colleagues in the English Channel. By the summer of 1942 a complete Norwegian flotilla had been formed and in the later stages of the war the *communiqués* recording the attacks of Norwegian light coastal forces on the enemy convoys and supply ships off the coast of Norway followed one another with almost monotonous regularity.

In the commando raids on the coast of Norway, the local knowledge of Norwegian officers and men was exploited to the full, either independently in their own craft or in co-operation with British forces, such as the Lofoten Islands raid. Less spectacular but essential and highly efficient service was rendered by Norwegian minesweepers from Iceland to the coast of Palestine, both in converted trawlers and whalecatchers and in the minesweepers proper transferred from British and American sources.

In the operations for the liberation of their country ships of the Norwegian Navy took the fullest possible part and they reaped their reward when in the end they conveyed their King back to his country on June 7, 1945, the last stage of his passage being made in H.N.M.S. Heimdal, in which he had arrived in Norway to ascend the throne forty years before.

THE ROYAL NETHERLANDS NAVY.

The German invasion of Holland began in the early hours of May 10, 1940. It did not find the Dutch forces unprepared. In the anxious days that followed the invasion of Norway the Dutch Government had taken precautions. In the British Admiralty, too, though the desirability of avoiding any compromise of Dutch neutrality precluded prior consultation, plans had been prepared for rendering help should the necessity arise.

In the event German naval forces did not take part, and it was in the ports and inland waterways, for the most part under heavy air attack and lacking freedom to manoeuvre, that the Dutch Navy was called upon to support the land troops with gunfire, to bombard or to deal with airborne troops and parachutists. The brunt of this fell on the gunboats, torpedo boats, and other small vessels that formed the bulk of the naval forces in home waters. The destroyer Van Galen, however, rendered notable service until she was put out of action by dive-bombing attack at Rotterdam. In the Zuider Zee Dutch naval forces, reinforced by British motor torpedo boats, successfully prevented an attempt by the enemy to ferry their troops across by water after an earlier attempt to cross the main dyke had been repulsed with the help of the gunboat Johann Mauritz. A feature of the German plan was extensive magnetic minelaying by aircraft in the harbour approaches, the ports, and waterways. This had been

foreseen and British minesweepers arrived in Dutch waters on the evening of May 10, but the Dutch themselves had no sweepers equipped to deal with magnetic mines. The losses, including those of merchant ships, due to this form of attack were considerable and the sunken vessels obstructed the escape of others.

Nevertheless a number of vessels survived to reach the United Kingdom and later to render further useful service; they included several ocean-going tugs, to whom a special tribute must be paid for their successful and arduous work in the salvage of ships damaged by submarine attack. In addition certain warships in various stages of completion were successfully brought over, including the light cruiser *Heemskerck*, two submarines, and the destroyer *Isaac Sweers*. The Royal Family were brought to this country by British destroyers, but it was a Dutch cruiser (the *Sumatra*) that subsequently took Princess Juliana and her children to Canada.

The ships transferred by the Royal Navy during the war included two fleet destroyers, four submarines, one ex-American destroyer (temporarily), a frigate and a corvette, motor torpedo boats and minesweepers.

The Royal Netherlands Navy served with distinction in many theatres of war from the Caribbean and west Atlantic—where in the early days the *Van Kinsbergen* captured some 60,000 tons of enemy shipping—to the S.W. Pacific. The submarines saw service in the north and were especially successful in the Mediterranean, where amongst other achievements they sank two enemy submarines. The *Isaac Sweers* was one of a division of four destroyers which in a brilliant night attack on an Italian convoy in December, 1941, sank two cruisers, a destroyer, and three transports. The *Campbeltown*, the frigate and corvette, shared in the escort of convoys in the Atlantic and Mediterranean.

But in December, 1941, it was in the S.W. Pacific that the Dutch Navy was making its chief and most notable effort in a campaign that was noteworthy too for inter-service and inter-allied co-operation, both strategical and tactical, and the integration of command. The allied air forces made a valuable contribution to the struggle by their reconnaissance and bombing attacks, but they were sadly short of fighters and Japanese air superiority was an important factor throughout, at times decisive.

When Japan invaded Malaya on December 7, 1941, the Dutch naval forces in the S.W. Pacific consisted of three 5·9-inch gun cruisers (the *De Ruyter*, flagship of Rear-Admiral Doorman, *Java*, and *Tromp*), six destroyers and 12 submarines, besides motor torpedo boats, minelayers, minesweepers, and auxiliary craft. At allied conferences at Singapore it had previously been agreed that, if the occasion arose, the Dutch would assist in its defence. Their help took the form of air reinforcements and the co-operation of their submarines. The latter managed, despite air and surface patrols and in shallow waters, to sink six enemy vessels on December 12 and 18. These successes, however, could not redress the disastrous loss of the Prince of Wales and the *Repulse* on December 10. The invasion of Borneo soon followed and Dutch submarines operating off the coast achieved further successes, but the Japanese advance continued. On January 4, General Wavell was appointed Supreme Commander in the ABDA area with the Commander of the U.S. Asiatic Fleet as the Allied Naval C.-in-C.

By the third week in January a landing at Balikpapan (an important oil refinery on the east coast of Borneo) appeared to be imminent, and on January 20 large convoys were reported to be entering the Macassar Strait.

They were heavily attacked by American and Dutch air forces and also with success by an American and a Dutch submarine and by a division of American destroyers in a spirited night attack in the face of greatly superior escorting forces ; but the landing was effected. On February 1 it was decided to form a combined Striking Force of allied cruisers and destroyers under the command of Rear-Admiral Doorman. A fortnight later Vice-Admiral Helfrich, R.N.N., became the Allied Naval C-in-C. with a British Flag Officer as Chief of Staff. In the operations that followed its inception, which included an effective night attack by American and Dutch cruisers and destroyers on a Japanese force landing on Bali, the Striking Force suffered losses and damage, while the intensive bombing of its bases increased the strain under which it was working. The Japanese advance could not be checked and on February 26 a large convoy was reported in the Java Sea. The Striking Force sailed that evening, consisting of five cruisers (two Dutch, one American, one British, and one Australian) and nine destroyers (two Dutch, four American, and three British). The enemy covering force was sighted at four o'clock the following afternoon, two 8-inch cruisers, at least two 6-inch cruisers, and 12 destroyers ; in gun power they were considerably superior and moreover the U.S. destroyers were comparatively slow. The Japanese too had the advantage of air reconnaissance and their submarines were in the area. The allied force made gallant and determined attempts to break through, or evade, the covering force to find the convoy, but in this, though they inflicted considerable losses, they were not successful. Early in the action the Exeter, one of the two 8-inch cruisers, was damaged and forced to withdraw under escort ; by 10 p.m. the other destroyers had either been sunk or had run short of fuel ; at about 11 p.m. the remaining cruisers, in their search for the convoy, met two enemy cruisers, and in the resulting action H.N.M.S. de Ruyter and Java were sunk, H.M.A.S. Perth and U.S.S. Houston, both damaged, lost contact and withdrew to their base. The battle was over ; the Japanese command of the Java Sea could no longer be disputed ; but the surviving allied ships had still to face the hazard of extricating themselves in the face of superior forces, and of those that had taken part in the battle only the four American destroyers succeeded in fighting their way out to safety.

Some indeed of the other Dutch forces in the area, including submarines, were able to escape and to render further valuable service from bases in Australia and the Indian Ocean ; here too other Dutch naval forces shared in the operations that culminated in the final defeat of the Japanese invaders.

In the operations that led to the liberation of Europe the Dutch Navy was worthily represented ; from the landings in Sicily, where the gunboats Soemba and Flores wore their guns out in supporting the allied armies, to the landing on the south coast of France and in the Normandy landings, where as a further contribution the cruiser Sumatra was sunk as part of the breakwater off the coast.

On May 8, 1945, the Royal Netherlands Navy had the proud satisfaction of taking their Queen back to the liberated area of Holland.

THE FREE FRENCH NAVY.

On June 28, 1940, Admiral Muselier arrived at Gibraltar with two warships that he had rallied at Marseilles. Arriving in London two days later,

the Admiral was entrusted by General de Gaulle with the command of the Free French Navy and Air Force. Some of the ships abroad had rallied to the movement, but the immediate problem was to find the men to man those that had escaped to British ports. The initial response to the senior officers' appeals was not great, but the movement gathered momentum, and by January, 1941, thirty warships were in commission; two years later, with 6,000 officers and men, the F.N.F.L. had become the second largest of these allied navies.

Of surface vessels, apart from the old battleships *Paris* and *Courbet*, which met an essential requirement as depot ships, the two most powerful ships were the *contre-torpilleur* *Le Triomphant* and the large destroyer *Léopard*; other ships available included small destroyers, torpedo boats, sloops, escort vessels, and minesweepers. Of these many were suitable only for restricted operations and were employed, as it became possible to man them, on the escort of coastal convoys, patrols, and other local services. The sturdy little *chasseurs* became well known in the escorts of the convoys in the English Channel and their participation in the Dieppe raid in 1942 was a proud day in their history. A Free French naval commando also took part in that raid.

But the F.N.F.L. had an important rôle to fulfil in maintaining touch with and co-operating in the defence of the various French colonies that had adhered to the Free French movement or in seeking to rally those that had not. The French West African colonies were, strategically and economically, of great importance to the Allies and the adherence of the equatorial group before the end of August, 1940, was encouraging. Unfortunately the expedition to Dakar in September was abortive, while the Free French expedition to the islands of St. Pierre and Miquelon in December, 1941, though it achieved its object, proved politically embarrassing.

For service in tropical waters there were available the specially designed colonial sloops, though they were supplemented by other vessels, and *Le Triomphant* served in the Pacific and Indian Ocean.

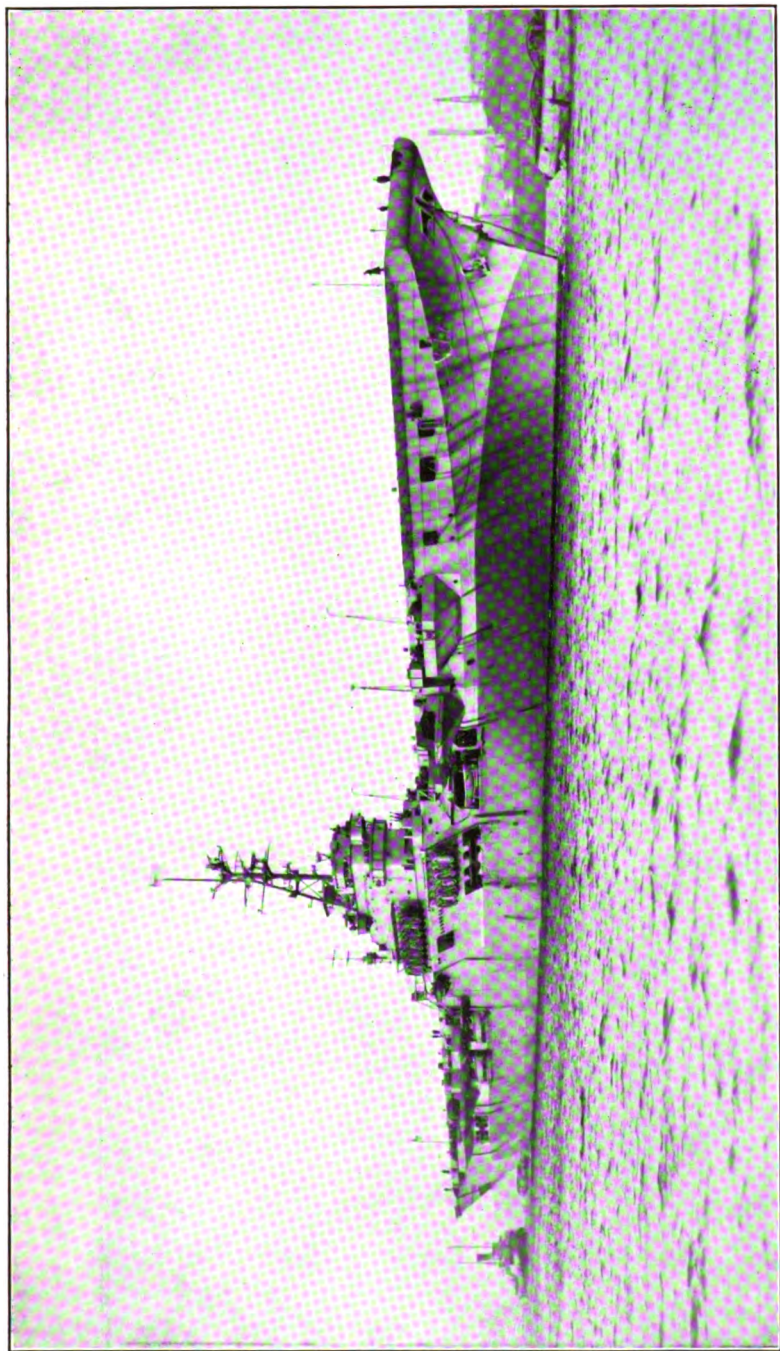
The submarines were among the first of the F.N.F.L. to get into action and three British submarines were lent later. They worthily upheld the reputation of that branch of the French Navy and the services of the *Rubis*, which as a minelayer was in a special category, were particularly distinguished. Up to 1943 the French submarines operated mainly in the north from the base which, with the British, Polish, Norwegian, and Dutch submarines there, afforded one of the happiest examples of inter-allied co-operation.

The transfer of a number of corvettes enabled the F.N.F.L. to make a valuable contribution to the Battle of the Atlantic, where they shared in the successes and losses of the allied escort groups in the grim battles of 1942. In May, 1943, the *Aconit* achieved a notable success by sinking two U-boats and rescuing the crew of H.M.S. *Harvester*, which had been damaged by ramming the first U-boat and then sunk by the second.

The name of the French Naval Barracks at Emsworth commemorated the fact that a detachment of the *fusiliers-marins* took part in the gallant defence of Bir Hacheim by Free French forces in May, 1942.

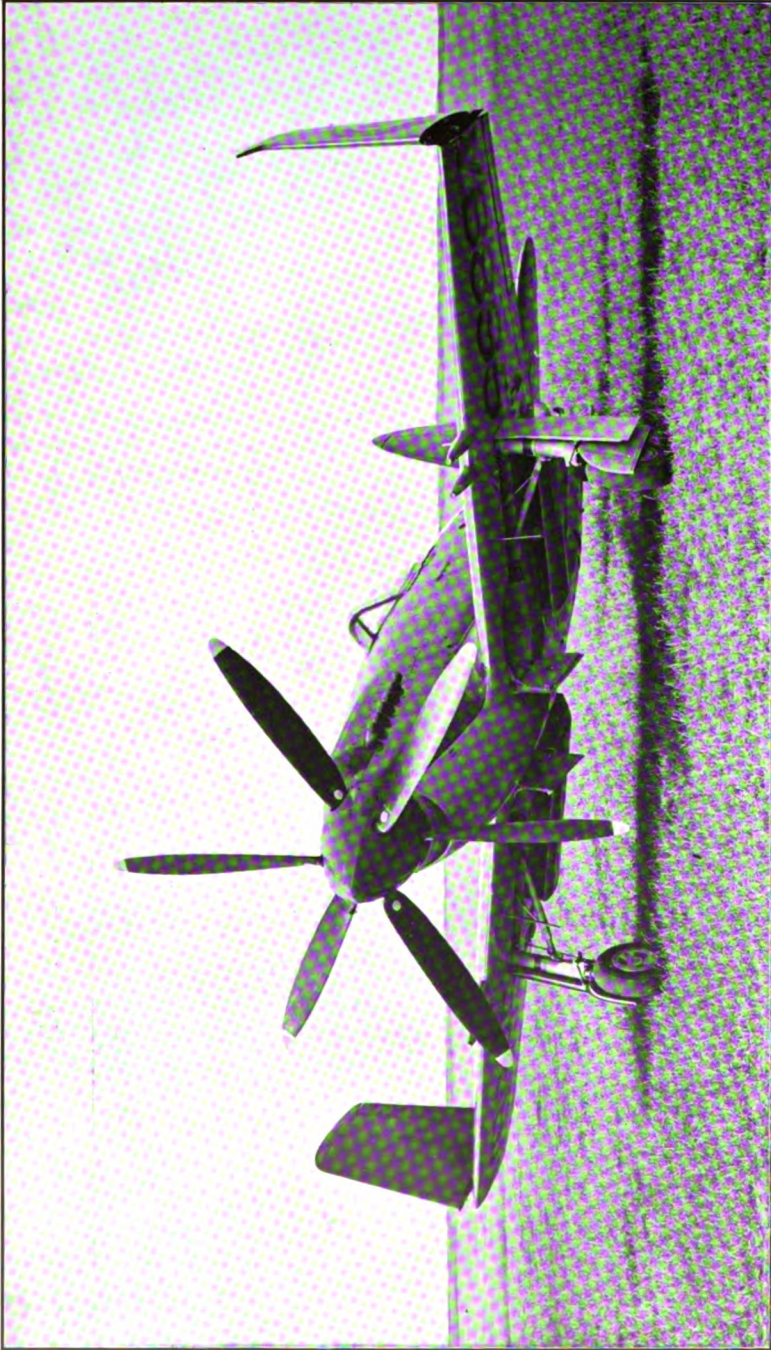
THE MARINE NATIONALE.

The agreement reached between Generals de Gaulle and Giraud on June 3, 1943, reconstituted the Marine Nationale though the fusion of the



French Light Fleet Carrier Arromanches (ex-H.M.S. Colossus).

(Courtesy of Messrs. Vickers-Armstrong.)



Seafang Fighter.

(Courtesy of Messrs. Vickers-Armstrong.)

naval forces was not at first without difficulties. The French naval forces overseas which thus became available included the battleships *Richelieu* and *Lorraine*, 8-inch and 6-inch gun cruisers, the *contre-torpilleurs* of the "Fantasque" class, and a number of destroyers. Many of these, however, were in need of refit and modernisation, an extensive programme for which was undertaken in the U.S.A., whence also was acquired in the course of time a large number of modern escort vessels of various types and minesweepers. As extra vessels became effective the weight of the French contribution in various theatres correspondingly increased. On return from the U.S.A., the *Richelieu* joined the British Home Fleet to work up to battle efficiency, a process which, to the intense disappointment of her officers and men, was not completed in time for her to take part in the operations that led to the sinking of the *Scharnhorst*. In due course the *Richelieu* joined the British Fleet in the East Indies, and after participating in various operations such as the bombardment of Sabang (Sumatra), she formed part of the Allied naval force present at Singapore when the Supreme Commander received the surrender of the Japanese forces in S.E. Asia.

In the Mediterranean, French naval forces made an effective contribution at the Anzio landing and in the operations that followed. A milestone was reached on June 19, 1944, by the capture of Elba by a French division under cover of French, British, and American naval and air forces. During this period too the high speed of the "Fantasque" class was exploited in a series of attacks on enemy convoys and supply ships in the Adriatic and Aegean with most successful results.

The climax of the Mediterranean invasion operations was reached in the large-scale landing east of Toulon on August 15, 1944. The French naval forces included the battleship *Lorraine*, five cruisers, and three *contre-torpilleurs*. Precisely one month later the French Fleet made its formal return to Toulon; the Chief of the Naval Staff was on board the cruiser *Georges Leygues* and to mark the significance of the occasion the French force was accompanied by a British and an American cruiser flying respectively the flags of Admiral Sir John Cunningham, Allied Naval Commander-in-Chief, and Rear-Admiral Davidson.

In the waters off the north coast of France, French forces played an active part in the numerous engagements with light German forces which preceded and followed the landing in Normandy. In these *La Combattante* (ex-British "Hunt" class) was especially prominent, and after taking part in the landing operations, to her fell the honour of conveying General de Gaulle to France on his first visit after D-day; her subsequent loss by a mine was a sad blow. The other French forces which took part in the landing operations included the two 6-inch gun cruisers *Georges Leygues* and *Montcalm*, who under Rear-Admiral Janjard formed part of the fire support groups in the American sector, while the old battleship *Courbet* found a fitting last resting place on French soil as part of the breakwater off the coast.

On April 15, 1945, as the first stage in the liberation of Bordeaux, an allied naval force under the French Rear-Admiral Rue attacked the defences in the Gironde estuary. The French ships included the *Lorraine*, the *Duquesne*, destroyers and frigates, accompanied by French, British, and Canadian minesweepers. The bombardment was accompanied by an attack by 1,800 American airplanes in preparation for the assault by French troops.

THE ROYAL HELLENIC NAVY.

The invasion of Greece by Italy, on October 28, 1940, had been preceded by a series of false accusations of breaches of neutrality, by the bombing of Greek ships on several occasions, and the sinking of the light cruiser *Helle*, while at anchor off Tinos on the Feast of the Assumption, by an Italian submarine. Thus when the ultimatum was delivered the Greek Navy was already on a war footing. It consisted of the cruiser *Georgios Averoff* (a distinguished veteran of the war of 1912), six modern or comparatively modern destroyers, four old destroyers, 13 old torpedo boats, and six submarines in serviceable condition. A number of the surface ships had been reconstructed between 1925/30, but by current standards the A/A armament of even the more modern ships was weak, and in some of the older ships hardly existed. There were in addition some 30 minesweepers, minelayers, and auxiliary craft.

Transport by sea between the islands and along the coast of the mainland has always been important in the national economy, and on the outbreak of war its importance was enhanced by the requirements of mobilisation and the maintenance of the army. From the outset, therefore, the surface forces were actively engaged in escorting convoys with, for the modern destroyers, occasional sweeps and bombardments in the Adriatic. The submarines operated on the Italian army's lines of communication across the Adriatic, sinking seven ships amounting to 70,000 tons during the first five months, for the loss of one submarine.

All these operations proceeded under cover of the British Fleet, for which, on the entry of Greece into the war, an advanced base had been established in Suda Bay, Crete, where F.A.A. Squadrons were landed to provide fighter protection for the convoys. The operations of the British Fleet from the attack on the Italian Fleet in Taranto on November 11, 1940, to the Battle of Matapan on March 28/29, 1941, are generally well known. Greek naval forces did not take part in them except for a useful share in the escort of the numerous convoys to Crete and the Piræus which carried supplies, equipment, and finally troops to the assistance of Greece. The troop convoy that had left Alexandria on March 26, and was no doubt the objective of the Italian forces that were defeated in the Battle of Matapan, was escorted by one Greek and three Australian destroyers under the command of Captain Mezeviris, R.H.N. As soon as news of the battle was received available Greek destroyers were despatched to the area, but only reached it in time to pick up survivors!

On April 6, 1941, Germany invaded Greece, and with their army came the Luftwaffe. In the withdrawal of their own and the allied troops the Greek Navy played its part, but many ships were sunk by air attack and in the end only three of the more modern and three of the older destroyers, three torpedo boats, the *Averoff*, a depot ship, and the five submarines survived to reach Alexandria. The Greek Navy did not take part in the subsequent operations off Crete, and though H.M.S. *Queen Olga* took H.M. The King to Crete, it was a British destroyer that eventually brought him to Alexandria.

It was not long before the available Greek ships were co-operating in the strenuous work of their allied colleagues in the eastern Mediterranean, the torpedo boats and old destroyers on convoy escort and patrol, off Alexandria, off the coasts of Libya and Palestine, while the modern ships worked farther afield and the submarines resumed their activities, and successes, in the Adriatic and *Ægean*.

In the course of a Malta convoy the Queen Olga shared with a British destroyer in sinking a U-boat and later took part attack with British destroyers in a successful night on an Italian convoy off Cape Spartivento. After the entry of Japan into the war, useful employment was found for the Averoff in the Indian Ocean.

During the war eight destroyers (six "Hunt" class, Echo and Boreas), four corvettes, one submarine, and motor minesweepers were lent to the Royal Hellenic Navy, three L.S.Ts. were also manned. Many of the names given to the destroyers and corvettes, such as Miaoulis, Kanaris, Tombazis, were appropriately those of the patriots who distinguished themselves at sea in the War of Liberation in the second decade of the nineteenth century.

The Greek Navy was throughout mainly employed in the Mediterranean, where the climate was more congenial to them than in the north and where some were rewarded by an occasional glimpse of their homeland in the course of their operational activities. A few days before the landing in Sicily, in which the Queen Olga, the "Hunt" class destroyers, and the corvettes were engaged, the Pindos sank a U-boat off Pantellaria. In due course, too, Greek ships took part in the Salerno landing and in operations off the coast the Queen Olga was sunk. When the Italian fleet surrendered, the Kanaris accompanied the Warspite, who led them back to Malta—a well-deserved tribute to the Royal Hellenic Navy and the peoples of Hellas.

After the landing on the south coast of France on August 15, 1944, in which Greek ships took part, the Allies were able to devote increased attention to the Aegean and the Greek Navy turned eagerly to the operations directed to the liberation of their country. Athens was liberated on October 13, by British commandos transported in British and Greek warships, and two days later a combined British and Greek naval force with Greek troops, stores, and equipment anchored off the Piraeus. Salonika was re-occupied on November 1, by which time the allied operations during the preceding six weeks had resulted in sinking or damaging 47 enemy warships or transports and some 50–60 small craft. The fall of Salonika sealed the fate of the remaining German garrisons in Crete, Rhodes, and other islands and the inevitable end followed in due course.

Of the nine destroyers and torpedo boats and five submarines that had escaped in April, 1941, to continue the struggle, five destroyers and two submarines returned home.

YUGOSLAVIA.

The German invasion of Yugoslavia began on April 6, 1941, and within a fortnight the Government was forced to ask for an armistice under the terms of which the Navy was to be handed over. It included a comparatively modern flotilla leader (the Dubrovnik), three smaller but more modern destroyers, a flotilla of motor torpedo boats, and four old submarines, besides old torpedo boats and various auxiliaries.

After an abortive attempt to intervene at Zara, the Navy had been concentrated at Kotor, where it was subjected to frequent air attacks and had suffered casualties. The prospect of escape seemed small, but, defying the armistice terms, one of the senior officers persuaded two motor torpedo boats and the submarine Nebojsca to attempt it. Of the three modern destroyers only one was by then in serviceable condition and she was blown up by her officers. On passage the motor torpedo boats met

at night an Italian destroyer flotilla, but by a ruse escaped identification and safely reached Suda Bay, where the Senior British Naval Officer availed himself of their services to escort a convoy during the early part of their passage to Alexandria. They were subsequently employed on local patrols and on service off the Syrian coast until the difficulties of maintenance proved too great. The *Nebojsca* also escaped safely, but was not fit for further operational service. Of the Naval Air Arm, eleven seaplanes managed to get away and were employed on patrol duties until they too could no longer be kept serviceable and their crews were transferred to the R.A.F.

Later, the loan of a British corvette, which was named *Nada*, meaning "Hope," enabled the Royal Yugoslav Navy to resume its activities in the Mediterranean, where the *Nada* was employed for a time in convoy escort; a start, too, was made in training crews for minesweepers and light craft at Malta. But the political changes which led to the emergence of Marshall Tito as head of the State had their repercussions in the navy and terminated the services of the Royal Yugoslav Navy as such. The proportion of its officers and men that elected to serve under the new regime was not made public, but it would seem to have been limited; the crews of the small craft that operated in the coastal waters of the Adriatic during the later stages of the war had, for the most part, had little previous experience. The path of co-operation was not smooth, but results were achieved, and on April 17, 1945, it was possible to announce that "British M.T.Bs. and Yugoslav light coastal craft sank several R-boats, F-lighters, and small craft off the Gulf of Venice and Trieste."

BELGIUM.

Though Belgium had no navy before the war, the State Marine, the merchant service, and the fishermen provided a nucleus of seamen and other young men proved anxious to make their contribution to the war effort by service at sea. From the outset, a number of small craft of various types that had escaped to this country were most usefully employed with their Belgian crews on the examination service and other harbour duties, but for combatant service special arrangements had to be made. To preserve their national identity, which was important, a novel expedient was adopted by the constitution in April, 1941, of the *Section Belge* of the Royal Navy, into which the men were entered under the same conditions as British seamen engaged for hostilities only while the officers were given commissions in the R.N.R. or R.N.V.R. Ships manned by the *Section Belge* had the proud privilege of wearing the Belgian ensign side by side with the White ensign.

As the training of the *Section Belge* progressed its activities expanded, and by 1942 the ex-French fishery protection vessel *Quentin Roosevelt* had been manned, four trawlers were employed on mine-watching and patrol duties, whilst others served usefully as tenders to depot ships and on target-towing duties. Trawlers converted for boom defence work too did excellent service, and some made the long voyage round the Cape to the Mediterranean and Indian Ocean. But by 1942 a start had also been made in building up a flotilla of motor minesweepers which rendered efficient service up to and after the landing in Normandy, when in due course they found themselves back in their familiar home waters, facing indeed a particularly formidable task. It was in 1942 also that the *Section*

Belge manned the corvettes *Buttercup* and *Godetia*, which took their place in the convoy escort groups ; a service which continued until with the approach of D-day it was decided that their officers and men would be more usefully employed in manning additional minesweepers and in the port parties that would be required as their ports were freed. Antwerp especially was to have important functions in the maintenance of the allied armies and in ship repair work. The repair of 1,000 allied warships and merchant ships by Belgian workmen during the first six months of 1945, despite heavy attack by flying bombs during a part of the time, was indeed a most notable contribution to the allied war effort.

At its peak, the *Section Belge* amounted to 90 officers and 400 men. A number of officers for whom no sea-going appointment could be found rendered useful service in the Naval Control Service and other British administrative posts. Officers and men who had served in the *Section Belge* formed a nucleus from which Belgium set about creating a post-war Navy.

DENMARK.

The first and in fact the major contribution that the Free Danes were able to make to the allied war effort at sea was provided by the services of the Danish merchant ships, which had responded in substantial numbers to an appeal broadcast by the British and French Governments after the invasion to proceed to an allied port. Including fishing vessels, some 140 had arrived by May 1, 1940, a figure which increased to about 200, of which some 70 were fishing vessels, by 1944. It was necessary at first for technical reasons that Danish merchant ships should sail under the British flag, but on Christmas Day, 1943, the Minister of War Transport in paying a tribute to the value of their services announced that they might rehoist the Danebrog, a measure which gave immense satisfaction and presumably reflected the change that had been brought about in Denmark by the action of the Germans when on August 29, 1943, they brought constitutional government to an end.

The number of fishing vessels was augmented from time to time, as was announced, by the "capture" of others, a fiction designed no doubt to reduce the risk of reprisals on the men's families. These craft were engaged in fishing or employed in harbour services under Admiralty control, and in both their contribution was useful and welcome.

The Danish Council was anxious, however, to contribute more directly to the naval effort and their aspirations were met by the formation in 1943 of a Danish Section of the Royal Navy and the enrolment and training of the crews for two motor minesweepers, the officers being found from naval officers who had escaped or merchant service officers. The two minesweepers were manned in the spring of 1944 ; others followed ; and from this small nucleus was built up a highly efficient force which was later to undertake the difficult and exacting task of clearing the heavily mined waters of the Kattegat and other areas. Opportunity was afforded for officers surplus to minesweeping requirements to render service in their individual capacities in various ways.

LIAISON AND TRAINING.

It was evident that each allied ship operating under British control would require a British Naval liaison officer to interpret signals and to advise the commanding officer on procedure and administrative matters,

and that a small staff of British signalmen and W/T ratings would also be required to assist the allied communication ratings. So long as there were only the Polish naval forces to be dealt with, the situation was met by these arrangements and a B.N.L.O. at Polish Headquarters, while the Polish Naval Attaché formed a link with the Admiralty. But with the influx of ships, officers, and men from the occupied countries in the summer of 1940 it soon became apparent that more elaborate arrangements were required.

In its final form the liaison organisation evolved was under the general direction of the Principal Naval Liaison Officer (P.N.L.O.), a post that was held by a Flag Officer, with a small staff within the Admiralty and a B.N.L.O. at each allied headquarters in London, except that of the Dutch, who provided the liaison officer. A separate organisation, also under a Flag Officer, existed for liaison with the U.S. Navy, but for the remainder the P.N.L.O.'s organisation formed the main though not the only channel of communication between the Admiralty and allied headquarters on questions of policy and administration; the allied admirals, however, paid visits to the Members of the Board of Admiralty on matters of special importance and the Director of Naval Intelligence continued to deal with the Naval Attachés on appropriate subjects; operational orders were transmitted to allied ships through the same channels as for the British ships with which they were working. B.N.L.Os. were also required on the staffs of various senior officers abroad and at various naval establishments, so that as additional allied ships were manned the requirement amounted to some 150 British officers and about 100 communication staffs, who constituted a considerable addition to the requirements for the greatly expanded British Navy. Courses were instituted for the officers, who were mainly comparatively junior R.N.V.R. officers, but the language question was usually difficult. The position of the B.N.L.O. and his small staff was not always easy, but with few exceptions their tact and adaptability proved adequate to the occasion.

TRAINING.

At the outbreak of war two Polish cadet-training ships were in the Mediterranean, and in due course the officers, cadets, and men were brought to the United Kingdom, where the cadets completed their training under their own instructors; the Free French and the Dutch too set up colleges for their cadets; but many of nearly all nationalities were trained at the Royal Naval College, subsequently serving as midshipmen for a period of training in a ship of the Royal Navy, and later undergoing the usual courses as sub-lieutenants and in some instances as specialists.

Allied ratings were given their preliminary training mainly in H.M.S. Royal Arthur at Skegness, where the allied contingents made an interesting feature in the routine parades. Technical instruction in gunnery, torpedo, signals, and radar was given at one of the R.N. establishments, and it was in these courses that the language difficulty was greatest, though a number of allied officers and men were trained as instructors.

Allied ships destined to take part in anti-submarine work shared with their British colleagues the rigours of a period of training and working-up at an establishment where the complicated situations presented in the course of training proved at times somewhat bewildering, but from which they emerged full of confidence at their ability to deal with the real thing.

The tactical side was studied at the tactical course in the Western Approaches Command, and the training there did much to ensure proper team-work in the inter-allied escort groups.

Allied minesweepers were trained in their complicated task at the British establishment in the Firth of Forth.

Though the burden was willingly shouldered, allied training requirements added not inconsiderably to the heavily pressed establishments of the Royal Navy.

WELFARE.

Welfare formed an important aspect of the work of the P.N.L.O's. organisation. Allied ships naturally shared in the amenities and facilities for sport and recreation provided for British ships ; wireless sets were provided as well as books and papers in their own language, largely through the agency of the British Council, who also did much in the way of arranging for English teachers. A large number of clubs and hostels were established for allied officers and men, many of whom, too, were invited to spend their leave in private houses ; indeed, a great deal of the welfare work was on a voluntary basis, and it is to be hoped that the gratitude of the allied officers and men recompensed the men and women who devoted so much time and trouble to the work.

By way of postscript it may be added that for the minesweepers the battle did not end on VE-Day, and the close co-operation that had existed during the war was continued in the formidable task of clearing the sea of mines. The task in European waters was undertaken under the direction of the International Post-war Mine-clearance Organisation, in which all countries concerned were represented.

“ LIAISON.”

EDITOR'S NOTE:—Since the above chapter was written, a number of original despatches dealing with the operations mentioned, have been published by H.M. Government.

CHAPTER XII.

THE 1946 ATOMIC BOMB TRIALS.

“Operation CROSSROADS.”

ORIGIN OF THE TRIALS.

IN January 1944 Admiral Blandy had, in his final report as Chief of the Bureau of Ordnance, urged that ships which would become surplus on the conclusion of hostilities should be retained for use as target vessels in extensive trials using new weapons. But it appears that it was his successor, Vice-Admiral G. F. Hussey, who first represented, together with Vice-Admiral Cochrane, Chief of the Bureau of Ships, that full-scale tests of the atomic bomb against ships should be carried out. This proposal was made in September 1945 by Admirals Hussey and Cochrane in a joint letter to the Chief of Naval Operations. A somewhat similar proposal, but with the particular object of utilising captured Japanese warships, appears to have been made at about the same time by General Arnold, Commander of the U.S. Army Air Forces, and Dr. Karl Compton of the Massachusetts Institute of Technology also submitted proposals of this nature on returning from a technical mission to Japan.

FORMATION OF “JOINT TASK FORCE ONE.”

The outcome of the foregoing proposals was that the U.S. Chiefs of Staff ordered the formation of a joint Army-Navy-civilian task force, to be known as “Joint Task Force One,” to execute the trials. Vice-Admiral W. H. P. Blandy was appointed Commander-in-Chief of this force and was made responsible directly to the Chiefs of Staff. A basic directive setting out his orders and responsibilities was issued and was referred to by Admiral Blandy in January 1946 in the following terms :

“The Joint Chiefs of Staff have directed that tests be conducted to determine the effects of atomic bombs against naval vessels so disposed as to obtain graded damage from maximum to minimum, in order to permit appraisal of the strategic implications of the atomic bomb. They have further directed that these tests be conducted by a Joint Task Force operating directly under the Joint Chiefs of Staff, and, secondarily, that the tests obtain, as far as practicable, the effects of atomic explosion against ground targets and airplanes, and scientific data of general value.”

ORGANISATION OF “JOINT TASK FORCE ONE.”

Under the Task Force Commander were placed two Deputies for—

- (a) Aviation. Major-General W. E. Kepner, U.S.A.A.F.
- (b) Technical Direction. Rear-Admiral W. S. Parsons, U.S.N.

The force was organised in the following eight groups :

1. Technical Group. Under Rear-Admiral W. S. Parsons (flagship U.S.S. Albemarle). Responsible for all Instrumentation and recording of the tests.

2. Target Group. Under Rear-Admiral F. G. Fahrion (flagship U.S.S. Fall River). Responsible for all target vessels and for salvage.
3. Transport Group. Responsible for sea transport, observer, and press ships.
4. Army Ground Group. Responsible for all Army test equipment.
5. Army Air Group. Responsible for all Army operational aircraft, air photography, Army drone and photographic planes and for air transport.
6. Navy Air Group. Under Rear-Admiral C. A. F. Sprague (flagship U.S.S. Shangri La). Responsible for Navy drone and photographic planes.
7. Surface Patrol Group. Responsible for surface safety arrangements.
8. Service Group. Responsible for all repair and service work, surveys, construction battalions, etc.

Over 120 major vessels, apart from the target ships, were utilised in these various groups, and the personnel taking part in the tests comprised the following :

Civilian Scientists and Technicians	..	..	..	550
Army Air Forces	..	..	..	2,750
Army Ground Forces	..	..	..	350
U.S. Marine Corps	..	..	..	150
U.S. Navy	..	..	..	38,200
Total				42,000

The actual cost has not been published, but Admiral Blandy stated that the figures quoted in the Press (\$400 million for the target ships and \$100 million for other expenses) were a fantastic misrepresentation, since the majority of the target ships were of no value except as scrap. He also said that the figure quoted for other expenses had "no foundation at all."

Admiral Blandy stated that he "named the project 'Operation Cross-roads' because it was apparent that warfare—perhaps civilisation itself—had been brought to a turning-point in history by this revolutionary weapon."

CHOICE OF PLACE AND TIME.

Although Bikini suffered from two major disadvantages, namely its distance from the mainland and the inevitably deleterious effect of its very damp climate on scientific instruments, these were, compared with any of the other possible sites considered, outweighed by the following substantial points in its favour :

- (a) It was sufficiently remote from other important land masses.
- (b) It possessed a large and safe anchorage.
- (c) It was off the normal path of typhoons.
- (d) It was reasonably near to the air bases already established at Kwajalein (220 miles north) and Eniwetok (200 miles west).
- (e) The climate afforded a reasonable expectation of sufficiently good weather for very high altitude visual bombing.

- (f) A good probability of a constant wind, at any rate below 20,000 feet, existed. The wind up to 60,000 feet had, on the experience gained from the atomic bomb attacks on Japan, to be taken into account, owing to the possible deposition on land of the radio-active fission products.
- (g) It had a small and co-operative native population of 167 persons, who were removed to the neighbouring island of Rongerik (109 miles east).

The dates originally fixed for the first two tests were May 15 and July 1, 1946, but on March 22 the President announced a postponement "for about six weeks." It is believed that this postponement was actuated, at any rate in part, by the necessity for avoiding the absence of numerous Congressmen from Washington at a time when much important legislation, including the British loan, was under discussion. This postponement substantially increased the difficulties of the Task Force Commander, since completion of the operation had been promised by September 1, by which date the large number of scientists and technicians lent by service and industrial laboratories and by the universities had to be returned to the mainland. Admiral Blandy decided that the only possible way of adhering to the completion date was to reduce the six weeks' interval between the two tests, and he therefore fixed the revised dates as July 1 and 25. This involved acceptance of a considerable gamble on obtaining favourable weather for the first test, and it was therefore decided that if postponement of Test A beyond a certain date should be necessitated it would be cancelled and Test B only carried out.

In the event the weather forecasters proved somewhat pessimistic regarding the probability of obtaining the desired conditions in the Marshall Islands in July, and no difficulty was experienced in adhering to the revised programme.

OBJECTS OF THE TEST.

Admiral Blandy stated that his objects were :

1. Primarily to test the effect of the atomic bomb against naval vessels in order to gain information on possible changes required in ship design, in tactical formations at sea and anchoring distances in port, in the number and location of operating bases and repair yards, and in the strategic disposition of ships.
2. Secondly to test the effect of the atomic bomb against both airborne and grounded aircraft and upon a wide variety of military ground weapons and equipment in order to learn what redesign might be necessary and what measures of dispersal were required to minimise the effects of the bomb.
3. To obtain further data regarding the effect of the bomb on living beings, to improve knowledge on protective measures and on the treatment of persons exposed to the effects of atomic explosions.
4. To gain information regarding the relative value of atomic bomb attacks on naval vessels as compared with other targets.
5. To gain further information of general scientific value on the phenomena which accompany atomic explosions.

The purposes of the tests, as outlined above, were publicly stated by Admiral Blandy on more than one occasion. Yet the idea that the tests were really intended to show whether navies were obsolete or not kept on reappearing, and the Admiral had repeatedly to deny this and to emphasise that the tests "were not intended to prove or disprove anything."

OPPOSITION TO THE TESTS.

From the time of the earliest announcements on the subject opposition to the tests became apparent and, at times, very vocal. It came from numerous sources of which the following were, perhaps, the most important :

- (a) The nuclear physicists who said that no information which could not be obtained by laboratory methods would be derived, that no enemy would use the bomb against ships when it could be used far more effectively against cities and industrial areas, and that the destruction of relatively few ships would tend to lull the nations into a false sense of security regarding the bomb's powers and so weaken the resolve to place it under effective international control.
- (b) Those who predicted catastrophies such as tidal waves, a nuclear chain reaction in the ocean, destruction of the sea-bed, and many other hair-raising impossibilities.
- (c) Humanitarians who objected particularly to the employment of animals in the tests, disregarding that only by such experiments could the physical effects on human beings be deduced.
- (d) Politically minded persons who feared that the tests would be regarded as a form of atomic sabre-rattling and so give offence to other nations.
- (e) Would-be guardians of the American public purse who considered the expense unjustified.

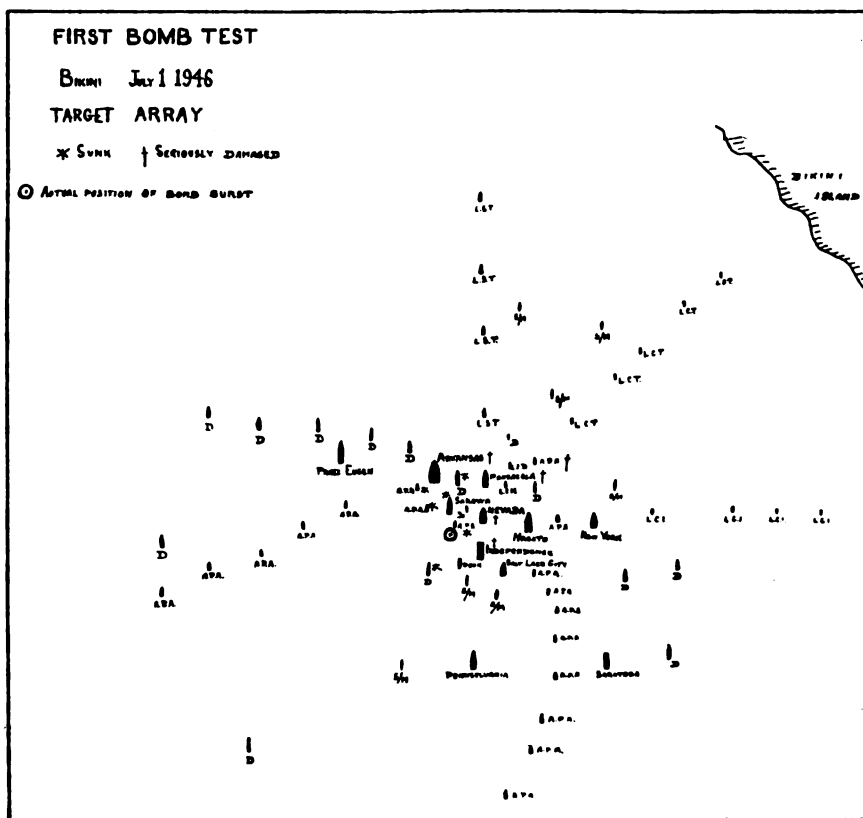
It was no doubt the numerous opposing elements and factions which caused Admiral Blandy to say that "Operation Crossroads seemed to me at first the most unpopular activity I had ever taken part in," and to reply to all his opponents must have placed a considerable additional burden on his shoulders. It seems, however, that opposition, at any rate in its most vociferous form, decreased as the President, Congress, and the U.S. Chiefs of Staff all made it plain that the operation would be proceeded with and as the actual dates approached.

PLANNING, TARGET ARRAYS, AND TYPES OF BURST CONSIDERED.

The administrative, technical, and operational planning started about November 1945, and it seems, from the frequent changes made, that discussion and controversy must have centred around two questions, namely the spacing of ships in the target array and the types of burst to be used. With regard to the first the arrangement of ships finally decided on possibly represented a compromise between those elements who wished to place as many ships as near to Zero Point as possible, thus giving the bombs the opportunity to exact the heaviest possible toll, and those who believed that an exactly symmetrical array would afford the maximum of scientific

data from instrumentation results. Another important consideration was that serious loss of instruments and of records would occur if the target ships were so closely spaced as to produce sympathetic conflagrations. As Admiral Parsons put it, "We don't want to set off a fire chain reaction."

The solution arrived at was to place a cluster of about twenty ships of all classes within half a mile of Zero Point and also to have radiating lines of ships of the same classes (e.g. destroyers, L.S.Ts., L.C.Is., and attack transports) equally spaced between Zero Point and $1\frac{1}{2}$ to 2 miles. This



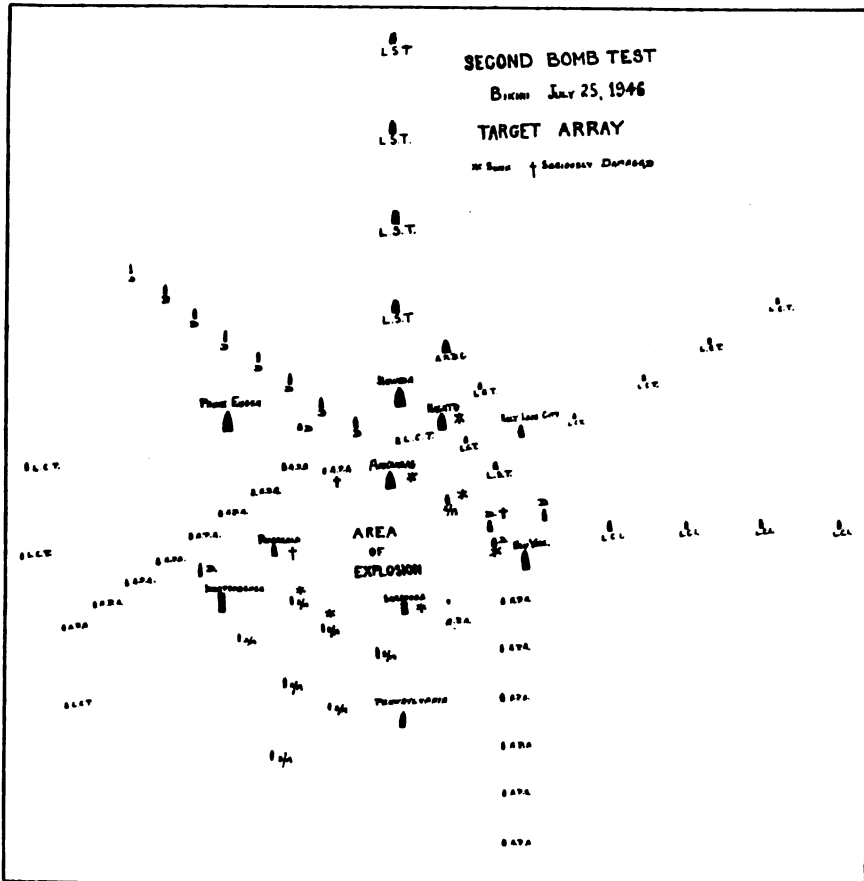
array predicated, if the maximum of instrumentation data was to be obtained, the achievement of a bombing accuracy in the case of the air burst of a fairly small order—which, as will be seen, was not in fact achieved in Test A.

The Task Force Commander frequently pointed out that the target arrays finally decided upon in no sense represented any possible or probable formation at sea or in harbour. It had become clear in the early stages of planning that no arrangement of target ships could possibly simulate war conditions and at the same time provide scientific and technical information of the type needed. Any attempt to represent war conditions was therefore abandoned, and the artificiality introduced by this necessary measure is perhaps best emphasised by pointing out that there were

twenty-three ships inside the radius normally occupied by one capital ship in a task force at sea or by three major units in a typical fleet anchorage.

The plans give an approximate idea of the target arrays used.

It was announced at an early date that the bombs to be used would be of the same type as that dropped on Nagasaki, that is to say with plutonium (U 239) as the fissionable substance and not uranium (U 235), as was used at Hiroshima. It was always intended that Test A should be an air burst



“several hundred feet above the targets,” but early announcements stated that in Test B the bomb would be fired on the surface of the lagoon. This was later changed to a shallow underwater burst at some depth in the lagoon, which around Zero Point was about 30 fathoms (180 feet) deep. The third test was always intended to be a deep underwater explosion, but after the successful completion of Tests A and B, this was cancelled by the U.S. Chiefs of Staff in September 1946.

The final decision regarding the types of burst to be used was based on the desire to use first those bursts which would provide the most valuable overall data.

TARGET SHIPS SELECTED.

The ships finally allocated for use in the target arrays comprised the following :

- 4 battleships—Nevada, Pennsylvania, New York, and Arkansas. These ships were all from 30–34 years old, the Arkansas being the oldest battleship in the U.S. Navy. But the Nevada and Pennsylvania had been extensively modernised and reconstructed in recent years. Displacements varied from about 27,000 tons for the Arkansas and New York to 29,000 for the Nevada, and 33,100 for the Pennsylvania.
- 1 fleet aircraft carrier—Saratoga, 33,000 tons, first commissioned 1927.
- 1 light fleet aircraft carrier—Independence. Displacement about 13,000 tons. Of war design and construction. Completed about 1943.
- 2 heavy cruisers—Pensacola and Salt Lake City, sister ships of Washington Treaty standard tonnage (10,000) and first commissioned 1929–30.
- 13 destroyers—Of various types and classes, but mostly of the "Sims" class (1939–40, 1,570 tons), "McCall" class (1939, 1,500 tons), "Craven" class (1937, 1,500 tons), and "Mahan" class (1936, 1,500 tons).
- 8 submarines—Three of pre-war design (1938–40, displacement about 2,300 tons) and five of war construction (1942–43).
- 19 attack transports (A.P.As.)—All of war design and construction. Mass-produced ships with all-welded hulls. Displacement about 6,800 tons.
- 3 concrete vessels—Two barges and a floating dock.
- 6 landing ships (tank)—Of war design and construction. Displacement about 4,000 tons (loaded).
- 6 landing craft (infantry)—Of war design and construction. Displacement about 385 tons (loaded).
- 15 landing craft (tank)—Of war design and construction. Displacement about 280 tons (loaded).

In addition to the foregoing American ships, the ex-German heavy cruiser Prinz Eugen and the ex-Japanese battleship Nagato and light cruiser Sakawa were also allocated as target ships.

A number of Combined Operation craft and a quantity of associated equipment was moored permanently to the beach off Bikini Island in order to obtain some information on the effects of the bursts on a landing operation.

The actual number of ships used as targets was apparently about 82 in Test A and 84 in Test B. Considerable trouble and expense were incurred in preparing the target ships for the tests. The major ships were all given special overhauls and inspections in Navy yards, with special attention paid to water-tight integrity. Except for the Japanese battleship Nagato, whose bomb damage had not been repaired, and for one or two ships not fully refitted after being damaged in action, the target ships were all in apparently sound condition, even though many important units were too old to be taken as truly representative prototypes of their classes.

EMBARKATION OF EQUIPMENT FOR TEST.

In accordance with Admiral Blandy's second object a very wide variety of all types of naval, army, and air equipment was embarked in the target ships for test purposes. Army tanks, guns, and vehicles, naval and army ammunition, aircraft and components, and stores of every conceivable type, from armour plate to clothing and rations, were allocated to ships at different positions in the target array in order that their resistance to the phenomena produced by atomic explosions might be ascertained. All this material was assembled, placed in position, and recovered for inspection (if it survived the tests) with the utmost care and thoroughness, and no doubt much valuable information will be derived from the results when analysis has been completed.

INSTRUMENTATION OF THE TESTS OF RECORDING OF RESULTS.

The measurement and recording of the results of the bomb bursts was, under Rear-Admiral Parsons, the responsibility of Dr. R. A. Sawyer, the Chief of the Technical Staff. Instruments were used to accomplish this "graphically, photographically, electronically, and radiometrically." Their purpose was to measure and record the blast, pressures, shock, and temperatures generated and the radio-activity produced as functions both of distance from Zero Point and time after bomb burst, or, as Admiral Parsons put it, "the nuclear and explosive efficiency" of the bombs.

The target ships themselves were regarded as the principal gauges and they were very carefully measured before the tests. Instruments were installed to ascertain "how (much) they deformed and how fast" due to pressures and shock.

Special towers were built on the islands to carry cameras and television equipment; seismographs were installed on the islands; many recording instruments were carried in aircraft; others were placed in the water or on the bottom of the lagoon. Some were very simple instruments, such as five-gallon petrol drums or ball-crusher gauges for measurement of blast and pressures respectively, whilst others, such as tourmaline crystal gauges for recording pressures and telemetering them to distant receiving stations, were highly complex. Geiger counters were extensively used for measurement of radio-activity, and some were fitted to signal their results continuously by radio. Dr. Sawyer stated that as many as 10,000 pieces of equipment had to be installed for the tests and described it as "perhaps the most complicated laboratory set-up that has ever been undertaken." The difficulty of implementing these arrangements successfully in a remote part of the world with a bad climate for instruments and no readily accessible shore laboratories requires little emphasis. Yet the degree of success obtained was apparently satisfactory.

None of the recorded results has been released to the public.

ANIMALS USED IN THE TESTS.

It was announced that 200 goats, 200 pigs, and 4,000 white rats would be used to record the effects of the bomb bursts on living beings. A specially equipped ship, the U.S.S. Burleson, was provided to accommodate the animals and for the study of the results. Some of the animals were specially dressed in, for example, anti-flash clothing.

No information has been released regarding the results obtained from the animals. The radiation sickness produced in them will, in particular, demand protracted study. One pig, number 311, which was on board the ex-Japanese cruiser *Sakawa*, achieved considerable fame, however, by being picked up from the radio-active waters of the lagoon some 24 hours after the ship sank in Test A and yet surviving all her experiences.

AIR PLAN FOR THE OPERATION.

The main air base for the tests was at Kwajalein, where the Headquarters of the Deputy Task Force Commander for Aviation were situated. The operational aircraft were flown from there.

From Eniwetok the Army B.17 drone aircraft, four of which took part in each test, were operated. Navy F6F (fighter) drones were operated from the aircraft carrier *Shangri La* and landed on Roi Island. The successful simultaneous operation of this number of wireless-controlled aircraft was one of the noteworthy features of the tests. Their job was to fly through the bomb clouds and obtain measurements of radio-activity. Only one drone, a Navy fighter, was lost, and that before Test A. Another was lost by its mother plane as it flew through the cloud in Test A, flew on for 55 minutes, and was picked up by the *Shangri La*'s radar. The mother plane successfully recovered control and it was safely landed.

It should also be mentioned that in both tests a number of drone boats were used immediately after the bursts. They were controlled from a destroyer outside the lagoon, whose signals made them slip from their moorings, start engines, and then steer through the target array, signalling the radio-activity as measured by their Geiger counters and taking samples of the water when ordered to do so. This comprised another remarkable technical feat.

The 52 operational aircraft included :

- One B 29 as bomb carrier.

- Two B 29s to drop parachute gauges for pressure recording.

- Eight B 29s and two C 54s with a wide variety of motion and still cameras.

- Two PBM flying boats with Geiger counters for measuring radio-activity.

- Two helicopters for taking water and earth samples.

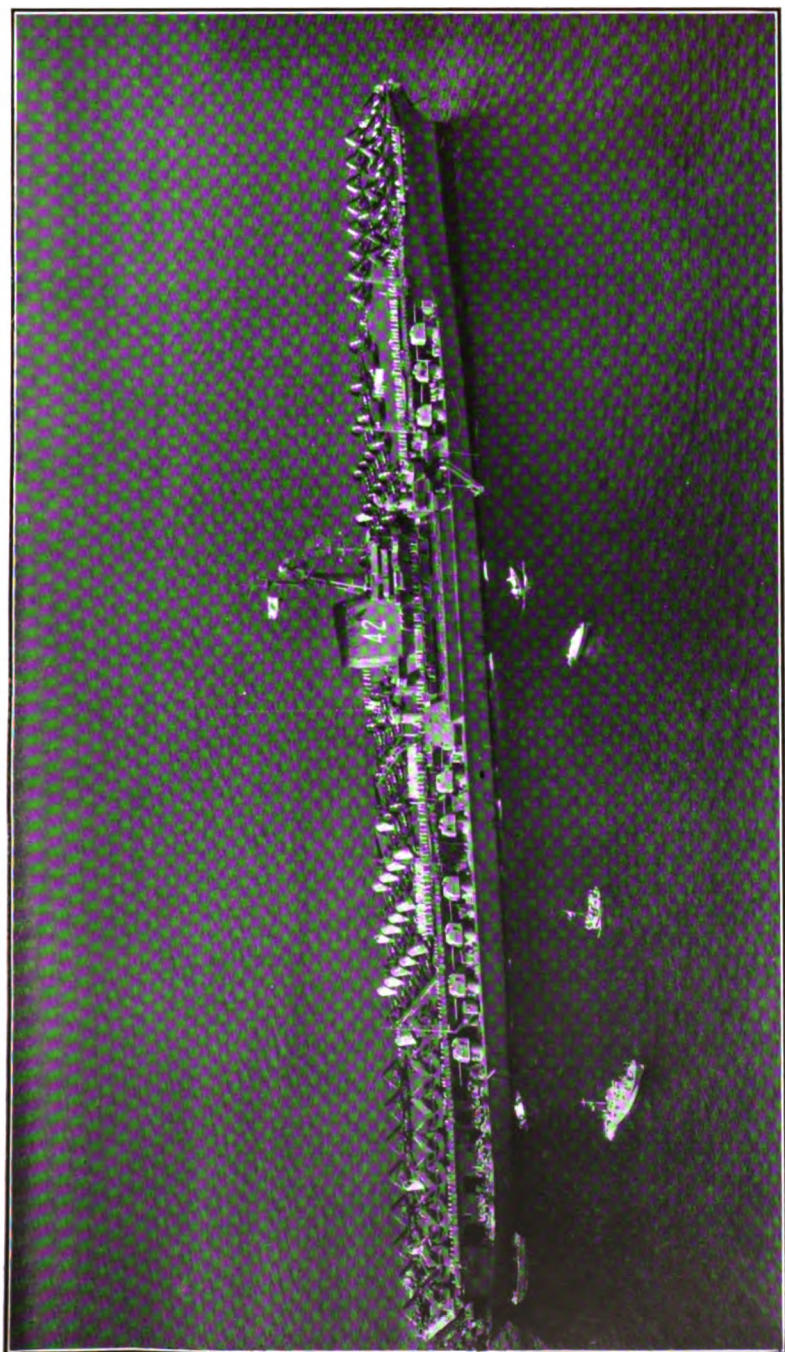
The air plan for both tests was generally similar, except that there was, of course, no bombing aircraft in Test B.

FOREIGN OBSERVERS; REHEARSALS.

Three Amphibious Force Headquarters Ships (A.G.Cs.) were allocated to carry U.S. military observers (U.S.S. *Blue Ridge*), United Nations observers (U.S.S. *Panamint*), Press representatives (U.S.S. *Appalachian*).

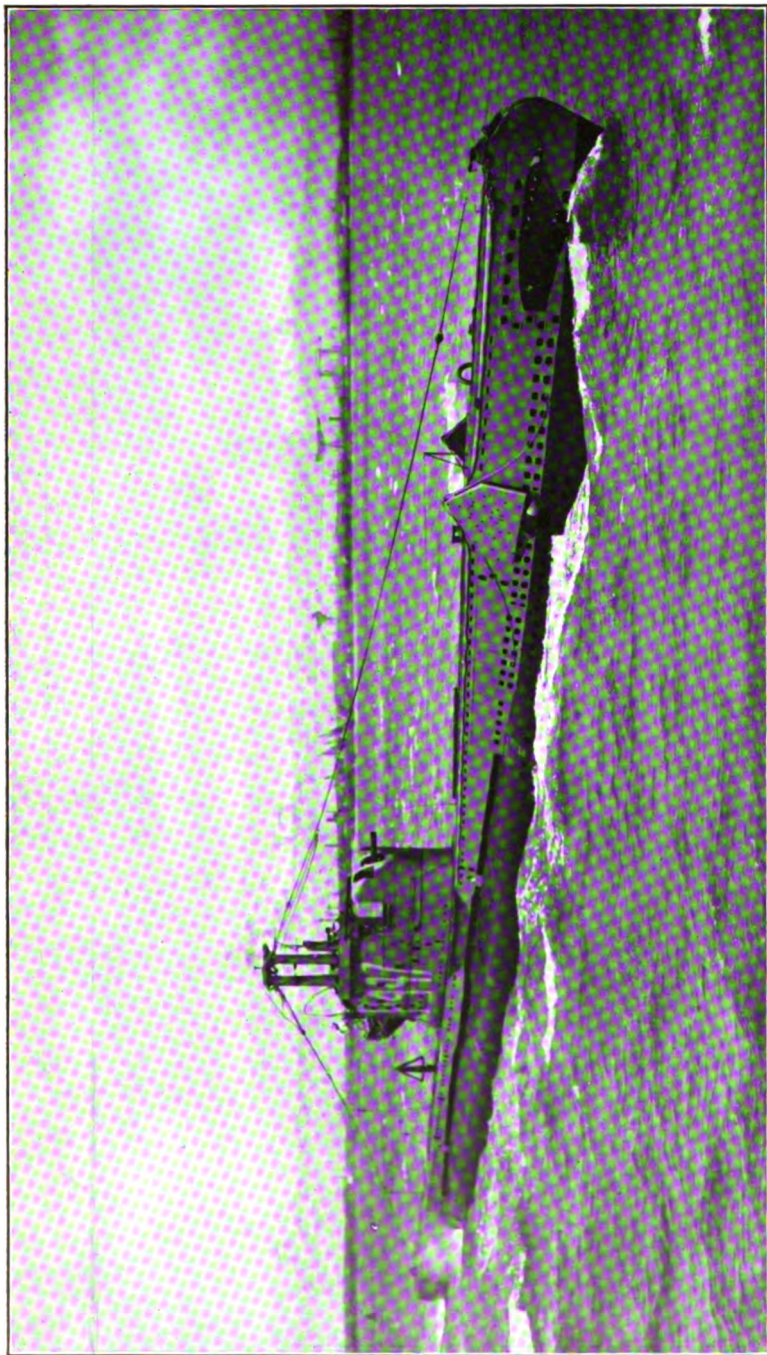
Each of the United Nations was invited by the U.S. Government to send two observers. Those representing Great Britain were Commander A. H. F. Noble, D.S.O., M.P., R.N. (Conservative M.P. for Chelsea), and Flight-Lieutenant F. Beswick, M.P., R.A.F. (Labour M.P. for Uxbridge).

All observers and Press representatives left Washington by special train on June 8, arrived at San Francisco on June 12, and sailed the same



Fleet Carrier U.S.S. Franklin D. Roosevelt.

(Official U.S. Navy photograph. By courtesy of Navy Department.)



H.M. Submarine Astute.
Courtesy of Messrs. Vickers-Armstrong.)

day for Honolulu and Bikini. During a two-day stay at Honolulu lavish entertainments were provided. The three observers' ships reached Kwajalein on June 28. A tour of the air base and a lecture by General Kepner and his staff took place there. The laboratory ship Albemarle, in which the bombs were assembled and tested, was the only ship of interest in port. The observers' ships reached Bikini on June 29 and steamed through the target array before anchoring.

For the next two days visits were made to various ships in the target array, including the Zero Point ship Nevada, which was painted a brilliant orange-red colour with white upper works and equipped with a remote-controlled searchlight and radio beacon to assist bomb aiming, the aircraft carriers Independence and Saratoga, the battleship Arkansas, heavy cruiser Pensacola, and the Japanese battleship Nagato.

All ships were fully prepared for the first test and all equipment was on board and in place. A full rehearsal, with the whole Task Force at sea and the target ships evacuated, had already been successfully carried out before the observers' ships reached Bikini.

"ABLE DAY."

Almost the entire Task Force (over 100 ships) put to sea during the afternoon of Able minus one day (June 30) and proceeded to their assigned sectors, the axis of which could be rotated in the event of a change in wind direction. The observers' ships were stationed about 18 miles to the east of Bikini.

Only a few ships remained in the lagoon overnight to complete the preparations, such as the starting of diesel generators, in the target ships and the setting of instruments. The last evacuations of target ships were completed before dawn on July 1, when the five ships which had remained overnight in the lagoon put to sea. The last ship to leave was Admiral Blandy's flagship the U.S.S. Mount McKinley.

There was heavy cumulus cloud at dawn on July 1, but the forecast was favourable and the take-off of the operational aircraft was delayed only for a quarter hour, putting "H Hour," the time of bomb-drop, forward to 9 a.m.

The bombing aircraft was in connection by voice radio with the observers' ships, which were also equipped with television screens showing the target array as seen from Bikini Island. The bombing aircraft flew at about 30,000 feet and carried out only one of the four practice runs which he was allowed to make. The call "Bomb's away" was then heard over the voice radio a few seconds after 9 a.m., and after expiry of the time of flight, the flash followed by a brilliant ball of fire was seen on the horizon. These phenomena were followed by the turbulent white cloud rising at obviously very great speed and reaching, in this test, a height of about 35,000 feet, at which it formed the familiar mushroom-shaped head. Here it should be mentioned that all observers were issued with very dark glasses, which entirely obscured vision, for protection against the blinding flash. The glasses were removed immediately the flash had occurred.

The observers' ships immediately closed the lagoon and observation of the target ships was made on the television screens and, when the targets reappeared above the horizon, from direct observation as well. Several fires and explosions were seen whilst closing the lagoon, but it later became clear that, except in the case of the Independence, which was gutted by

fire, secondary fires were not in fact serious and had nearly all occurred in the Army stores exposed for test. These were easily dealt with by the salvage tugs, which were among the first ships to re-enter the lagoon. The measures planned to ascertain whether the radio-activity dangers would permit of re-entry were put into action immediately after bomb burst, and were followed by the re-entry of the Task Force in the order established before the test.

The observers' ships steamed past the target array and anchored on the west side of the lagoon at about two-thirty in the afternoon. Inspection of certain of the target ships started next day.

THE EFFECTS PRODUCED BY AN AIR BURST ATOMIC BOMB.

These are as follows :

1. Air blast, which will tend to crush structure above the water line and to kill or maim exposed personnel. Blast damage to funnels, radar aerials, superstructure, and masts was the most outstanding visible effect of this test. Incidentally, it should be remembered that this is the first weapon to expose a whole ship to more or less equal pressures simultaneously.
2. Intense heat, which might ignite exposed inflammable material, endanger fuel and ammunition, and cause serious flash burns to exposed personnel. In the event, however, the fires caused were, except in the Independence, of insignificant importance.
3. Radio-activity, affecting personnel almost anywhere in the ships, at any rate at close ranges, due to the emission of gamma rays and neutrons. Casualties may, however, be delayed. (See Supplementary Report on Test A by Joint Chiefs of Staff Evaluation Board, below.)
4. Flash, which might cause blindness unless very dark goggles, such as were issued to all observers on this occasion, are worn by exposed personnel.

RESULTS OF THE AIR BURST.

The most authoritative information released with regard to the results of Test A is contained in the reports of the President's Evaluation Commission and the U.S. Joint Chiefs of Staff Evaluation Board, which will be extensively quoted in this paragraph.

Although the distance at which the observers' ships were stationed caused some disappointment regarding the phenomena seen and a feeling that these were less spectacular than had been anticipated, it was stated that the bomb actually exploded "with an intensity which approached the best of the three previous atomic bombs," which has been quoted as being equivalent, as regards pressure generated, to the detonation of 20,000 tons of T.N.T.

The Joint Chiefs of Staff report states that the bomb exploded at approximately the planned altitude, but 1,500 to 2,000 feet west of Zero Point. No explanation of this apparent error has been made public. The same report gives the following summary of the damage caused to the ships and the probable effects of the bomb bursts on their crews had they been on board.

- “(a) A destroyer and two transports sank promptly and another capsized. It later sank ; and the Japanese cruiser Sakawa sank the following day. The superstructure of the submarine Skate was so badly damaged as to make it unsafe to submerge the vessel. The light carrier Independence was badly wrecked by the explosion, gutted by fire, and further damaged by internal explosions of low order, including those of torpedoes. All the above vessels were within one-half mile of the explosion point.
- “(b) Numerous fires were started on other ships, including one on a ship two miles distant, which was apparently due to some unusual circumstance, since the other fires were much closer. Here it should be remembered that the target ships' decks carried a great variety of test material not ordinarily exposed on the decks of naval vessels.
- “(c) The only major combatant ships within one-half mile of the explosion were the battleships Nevada and Arkansas and the heavy cruiser Pensacola. The blast struck these from the after quarter. Apparently little damage was done to their hulls or their main turrets, but their superstructures were badly wrecked. These ships were unquestionably put out of action and would, along with many others within three-quarters of a mile, have required extensive repairs at a principal naval base.
- “(d) Other ships in the target array suffered damage in varying degrees, depending on position and type of ship, but there was relatively little damage at distances greater than three-quarters of a mile.
- “(e) The primary material effects noted were due to blast ; buckling of decks and bulkheads and destruction or deformation of lightly constructed exposed objects, including stacks (funnels), masts, and antennæ. Secondary effects were due to fire, and it is noteworthy that Army quartermaster stores and miscellaneous equipment placed on the decks for the test proved more vulnerable than normal naval deck gear. It should be pointed out that since the targets carried no personnel the fires were uncontrolled, and undoubtedly there was more damage than there would have been under battle conditions. Singularly, although considerable amounts of explosive ordnance were exposed on decks and in gun turrets, there is no indication on ships which remained afloat that any of this material was exploded by direct action of the atomic bomb. Fire-fighting ships entered the target area as soon as they could obtain radiological security permission and subdued a number of fires. The speed and efficiency with which these ships acted preserved for later examination a great deal of evidence of bomb action which might otherwise have been lost.
- “(f) Examination of the flash burn effects produced by the initial radiation from the explosion indicates that casualties would have been high among exposed personnel. However, it is the opinion of the Board that persons sheltered within the hull of a ship or even on deck in the shadow of radiation from the bomb

would not have been immediately incapacitated by burns alone, whatever might have been the subsequent radiological effects.

“(g) Within the area of extensive blast damage to ship superstructures there is evidence that personnel within the ships would have been exposed to a lethal dosage of radiological effects.

“ Personnel casualties due to the blast would no doubt have been high for those in exposed positions on vessels within half a mile of the target centre. Beyond this any discussion of the blast effect upon personnel will have to await the detailed reports of medical specialists.

“ In general, no significant unexpected phenomena occurred, although the test was designed to cope with considerable variation from predictions. There was no large water wave formed. The radio-active residue dissipated in the manner expected. No damage occurred on Bikini Island, about three miles from the explosion centre.”

The same body made a second report after Test B, the first section of which was supplementary to that published after Test A and is of particular interest as it gives an indication of the extent of the radiological hazard produced by an air burst. The supplementary report reads as follows :

“ In general the observations on ship damage presented by the Board in its first report were confirmed by engineering surveys. The location of the bomb burst, accurately determined from photographs, was such that only one ship was within 1,000 feet of the surface point over which the bomb exploded. There were about twenty ships within a half mile, all of which were badly damaged, many being put out of action and five sunk. It required up to twelve days to repair all these ships left afloat sufficiently so that they could have steamed under their own power to a major base for repair.

“ It is now possible to make some estimate of the radiological injuries which crews would have suffered had they been aboard the Test Able target vessels. Measurements of radiation intensity and a study of animals exposed in ships show that the initial flash of principal lethal radiation, which are gamma rays and neutrons, would have killed almost all personnel normally stationed aboard the ships centred around the air burst and many others at greater distances. Personnel protected by steel, water, or other dense materials would have been relatively safe in the outlying target vessels. The effects of radiation exposure would not have incapacitated all victims immediately ; even some of the most severely affected might have remained at their stations several hours. Thus it is possible that initial efforts at damage control might have kept the ships operating, *but it is clear that vessels within a mile of an atomic bomb air burst would eventually become inoperative due to crew casualties.*” (Italics are mine.)

CONCLUSIONS DERIVED FROM TEST A.

The U.S. Joint Chiefs of Staff's Evaluation Board summarised the conclusions as follows :

“ From what it has seen and from what it has ascertained from data now available, the Board is able to make certain general observations :

“(a) The atomic bomb dropped at Bikini damaged more ships than have ever before been damaged by a single explosion.

- "(b) The test has provided adequate data of a sort necessary for the redesign of naval vessels to minimise damage to superstructures and deck personnel from this type of bomb. Because of the nature of the first test (air burst), little information has been obtained on hull effects. Damage to ships' hulls will be studied specifically in the second test, when a bomb will be exploded under water.
- "(c) A vast amount of data which will prove invaluable throughout scientific and engineering fields has been made available by this test. Once more the importance of large-scale research has been dramatically demonstrated. There can be no question that the effort and expense involved in this test have been amply justified both by the information secured and by greatly narrowing the range of speculation and argument. Moreover, it is clear to the Board that only by further large-scale research and development can the United States retain its present position of scientific leadership. This must be done in the interests of national safety."

Admiral Blandy's remarks on the lessons learnt from both tests are given later (page 163).

"BAKER DAY."

For the second test the target array was somewhat rearranged and the bomb was suspended below a landing ship (medium) with a well built in the bottom through which a caisson with the bomb was lowered. The L.S.M. was also fitted with a tall radio mast for reception of the signals required to detonate the bomb. The actual detonating mechanism was apparently a clock actuated by more than one clock, which made it impossible to fire the bomb before or after certain times previously set. The mechanism had to receive a certain set of signals in the correct order to fire the bomb, thus preventing the possibility of this being caused through some stray radio signal. During the rehearsal for Test B on July 19 the dummy flash-bomb was actually fired accidentally some 15 minutes early, which caused considerable anxiety among the Press representatives present and called for an emphatic assertion from Admiral Blandy to the effect that a repetition of this accident on Baker Day was impossible.

The weather conditions required for the second test were not as exacting as for the first, since no spray or gases were expected to rise above 15,000 feet, up to which height constant winds from east or south-east were probable. A ceiling of 18,000 feet was also acceptable in this test. Nonetheless, preparations to evacuate Eniwetok and Rongerik were repeated as before Test A.

The majority of the Task Force put to sea on Baker minus one day and last-minute evacuations again took place at dawn on the day of the test. "H hour" had to be as early as possible because the good weather forecast might not last and because low tide was at 7.20 a.m. Since it was desired to avoid, if possible, flooding the islands, the bomb was to be fired as soon as possible after low water, and "H hour" was therefore fixed for 8.35 a.m.

Baker Day actually dawned beautifully fine and clear and the bomb was exploded exactly at "H hour." The observers' ships were this time stationed only eleven miles from Zero Point. An excellent view of the

target array was obtained and many of the ships could be continuously identified.

The gigantic column of water thrown up to a height of at least 5,000 feet in the first few seconds, and the succeeding cloud of spray and rain which gradually enveloped almost the whole target array are described more fully in the extract from the Evaluation Board's report given below. From the distance at which it was viewed by observers the spectacle was certainly very awe-inspiring.

THE EFFECTS PRODUCED BY AN UNDER-WATER ATOMIC BOMB BURST.

For the air burst the scientists and "phenomenologists" had the results of the three previous similar explosions to guide them as to what effects to predict, but this was the first atomic bomb to be exploded in the sea. Very careful calculations and predictions were made and Admiral Blandy states that these proved, in the event, remarkably accurate.

The principal effects expected were :

1. Underwater pressure tending to rupture the hull and sink the ships.
2. Underwater shock tending to loosen equipment attached to fixed parts of the ship and to throw loose articles about.
3. High waves endangering small ships and exposed personnel even in large ships. They were, however, apparently not as high as was expected. The maximum was stated by Admiral Blandy to have been 50 feet, and they were only 15 feet high at Bikini Island. Personnel would, in addition, be endangered by the radio-activity of the water contaminated by fission products.
4. Radio-activity caused by contaminated water and spray from the column falling on the ships and turning them into "radio-active stoves," at any rate until they had been decontaminated by washing down the decks and superstructures.
5. A blast wave, but much less intense than in Test A.

RESULTS OF THE UNDER-WATER BURST.

Here it is best again to quote directly from the Joint Chiefs of Staff Evaluation Board's report.

- " 1. The Board divided into two groups for the observation of Test Baker. Four members, after surveying the target array from the air, witnessed the explosion from an airplane eight miles away at an altitude of 7,500 feet. The other three members inspected the target array from a small boat the day before the test and observed the bomb's explosion from the deck of the U.S.S. Haven, eleven miles at sea to the east of the burst.
- " 2. The Board reassembled in the Haven on July 26 and the members have since examined photographs, data on radio-activity, and reports of other phenomena, and have inspected some of the target vessels. They also consulted with members of the Task Force Technical Staff.
- " 3. As scheduled, at 08.35 Bikini time on July 25 a bomb was detonated well below the surface of the lagoon, which at this point is

180 feet deep. This bomb was suspended from the L.S.M.-60 near the centre of the target array. The explosion was of predicted violence and is estimated to have been at least as destructive as 20,000 tons of T.N.T.

- " 4. To a degree which the Board finds remarkable, the visible phenomena of explosion followed the predictions made by civilian and service phenomenologists attached to Joint Task Force One. At the moment of explosion a dome, which showed the light of incandescent material within, rose upon the surface of the lagoon. The blast wave was followed by an opaque cloud which rapidly enveloped about half of the target array. The cloud vanished in about two seconds to reveal, as predicted, a column of ascending water. From some of the photographs it appears that this column lifted the 26,000-ton battleship Arkansas for a brief interval before the vessel plunged to the bottom of the lagoon. Confirmation of this occurrence must await the analysis of high-speed photographs which are not yet available.
- " 5. The diameter of the column of water was about 2,200 feet and it rose to a height of about 5,500 feet. The column contained roughly one million tons of water. For several minutes after the column reached maximum height, water fell back, forming an expanding cloud of spray which engulfed about half of the target array. Surrounding the base of the column was a wall of foaming water several hundred feet high.
- " 6. Waves outside the water column, about 1,000 feet from the centre of the explosion, were 80 to 100* feet in height. These waves rapidly diminished in size as they proceeded outward, the highest wave reaching the beach of Bikini Island being seven feet.* Waves did not pass over the island and no material damage occurred there. Measurements of the underwater shock wave are not yet available. There were no seismic phenomena of significant magnitude.
- " 7. The explosion produced intense radio-activity in the waters of the lagoon. Radio-activity immediately after the burst is estimated to have been the equivalent of many hundred tons of radium. A few minutes' exposure to this intense radiation at its peak would, within a brief interval, have incapacitated human beings and have resulted in their deaths within days or weeks.
- " 8. Great quantities of radio-active water descended upon the ships from the column or were thrown over them by waves. This highly lethal radio-active water constituted such a hazard that after four days it was still unsafe for inspection parties, operating within a well-established safety margin, to spend any useful length of time at the centre of the target area or to board ships anchored there.
- " 9. As in Test Able, the array of target ships for Test Baker did not represent a normal anchorage, but was designed instead to obtain the maximum data from a single explosion. Of the 84 ships and small craft in the array, 40 were anchored within

* These figures do not agree with those given below by Admiral Blandy and quoted above.

one mile and 20 within about half a mile. Two major ships were sunk, the battleship Arkansas immediately and the heavy-hulled aircraft carrier Saratoga after $7\frac{1}{2}$ hours. A landing ship, a landing craft, and an oiler also sank immediately. The destroyer Hughes, in sinking condition, and the transport Fallon, badly listing, were later beached. The submerged submarine Apogon was sent to the bottom, emitting air bubbles and fuel oil, and one to three other submerged submarines are believed to have sunk. It was found impossible immediately to assess damage to hulls, power plants, and machinery of the target ships because of radio-active contamination. Full appraisal of damage will have to await detailed survey by engineer teams. External observation from a safe distance would indicate that a few additional ships near the target centre may have suffered some hull damage. There was no obvious damage to ships more than half a mile from the burst."

RESULTS OF BOTH TESTS AND CONCLUSIONS THEREFROM.

After Test B the Evaluation Board released the following summary of the results and indicated at the same time certain conclusions to be drawn from both tests.

- " 2. It is impossible to evaluate an atomic bomb burst in terms of conventional explosives. As to detonation and blast effects, where the largest bomb of the past was effective within a radius of a few hundred feet, the atomic bomb's effectiveness can be measured in thousands of feet. However, the radiological effects have no parallel in conventional weapons. It is necessary that a conventional bomb score a direct hit or a near miss of not more than a few feet to cause significant damage to a battleship. At Bikini the second bomb, bursting under water, sank a battleship immediately at a distance of well over 500 feet. It damaged an aircraft carrier so that it sank in a few hours, while another battleship sank after five days. The first bomb, bursting in air, did great harm to the superstructures of major ships with a half a mile radius, but did only minor damage to their hulls. No ship within a mile of either burst could have escaped without some damage to itself and serious injury to a large number of its crew.
- " 3. Although lethal results might have been more or less equivalent, the radiological phenomena accompanying the two bursts were markedly different. In the case of the air burst bomb, it seems certain that unprotected personnel within one mile would have suffered high casualties by intense neutron and gamma radiation as well as by blast and heat. Those surviving immediate effects would not have been menaced by radio-activity persisting after the burst.
- " 4. In the case of the underwater explosion, the air blast wave was far less intense and there was no heat wave of significance. Moreover, due to the absorption of neutrons and gamma rays by water, the lethal quality of the first flash of radiation was not of high order. But the second bomb threw large masses of

highly radio-active water on to the decks and into the hulls of vessels. These contaminated ships became radio-active stoves, and would have burned all living beings aboard them with invisible and painless but deadly radiation.

- " 5. It is not too soon to point to the necessity for immediate and intensive research into several unique problems posed by the atomic bomb. The poisoning of large volumes of water presents such a problem. Study must be given to the procedures for protecting not only ships' crews but also the populations of cities against such radiological effects as were demonstrated in Bikini lagoon.
- " 6. Observations during the two tests have established the general types and range of effectiveness of air and shallow underwater atomic bomb bursts on naval vessels, army material, including a wide variety of quartermaster's stores, and personnel. From these observations and from instrumental data it will now be possible to outline such changes not only in military and naval design but also in strategy and tactics as future events may indicate."

Later on Admiral Blandy gave his deductions as follows :

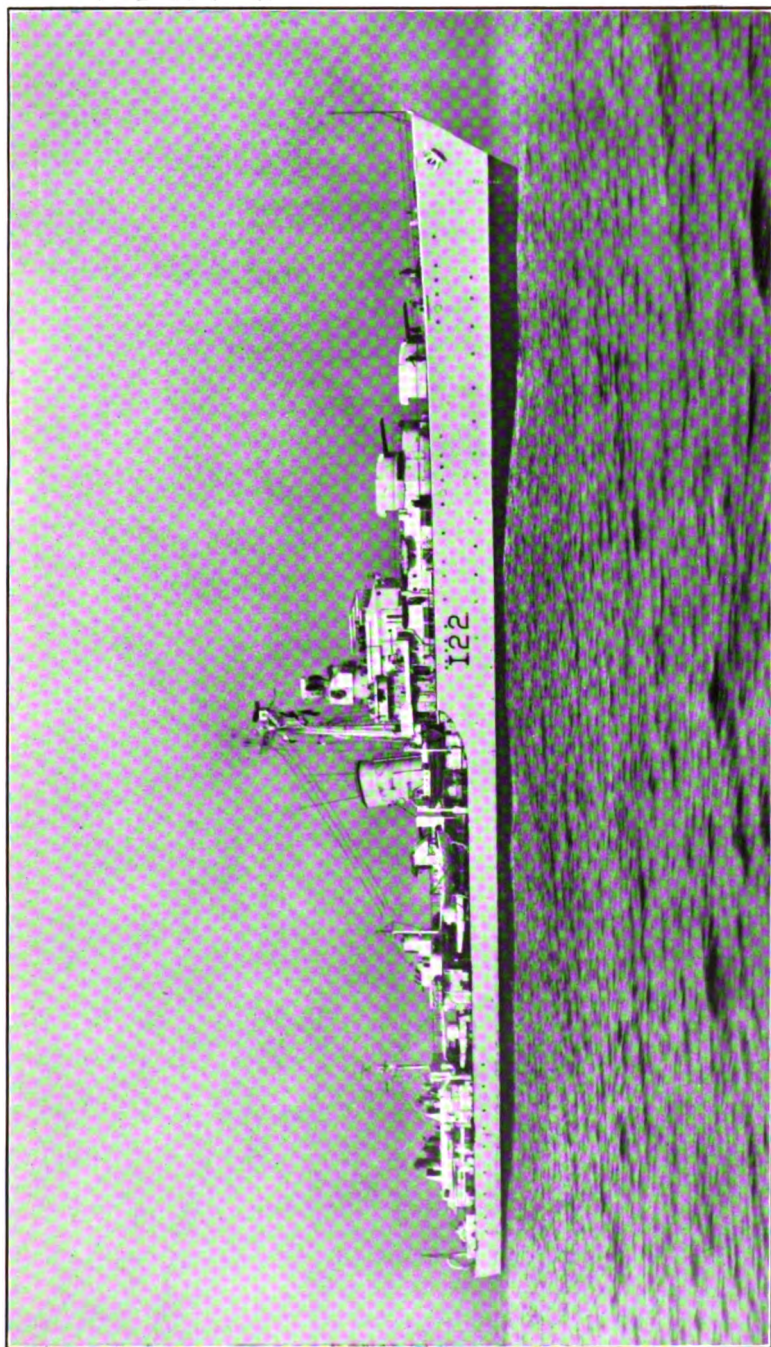
1. The air burst showed the need for "cleaning up," streamlining, and strengthening superstructures. The underwater burst indicated the need to strengthen ships' hulls.
2. The air burst pointed the way to changes in design to increase resistance to blast and protection from flash.
3. Protection from radiation must chiefly come from dispersal and decentralisation.
4. The provision to ships of equipment, such as Geiger counters, to detect the invisible radiations is essential and definite steps are needed to protect personnel from this new hazard.
5. Tactical changes in fleet and convoy formations at sea and in the disposition of ships in harbour are plainly necessary.

It is difficult from the released information to add very much to the foregoing authoritative and responsible pronouncements. That the tests were of very great value seems beyond question ; that the conduct of them was superbly organised and planned, and that they were executed with the precision of a combined operation in time of war was obvious to anyone present ; that the scientific and technical work put into the tests was of great complexity and apparently generally successful is a great tribute to the skill of the civilian scientists in the Task Force. The congratulatory messages passed to the Task Force Commander, his staff, and to all involved in Operation Crossroads by the President, the Joint Chiefs of Staff, and many others were certainly exceedingly well merited.

Admiral Mahan wrote that : " The student will observe that changes in tactics have not only taken place after changes in weapons, which necessarily is the case, but that the interval between such changes has been unduly long. This doubtless arises from the fact that an improvement of weapons is due to the energy of one or two men, while changes in tactics have to overcome the inertia of a conservative class, but it is a great evil. It can be remedied only by a candid recognition of each change." If this

statement, made over half a century ago, be applied to the introduction of atomic weapons it will be seen how this revolutionary change was, in fact, due to the energy of comparatively few men and that the changes in tactics necessitated thereby must be very far-reaching. How far Mahan's pessimism with regard to "candid recognition" and rapid acceptance of the consequential changes in tactics will, on this occasion, be substantiated only time will show. But that they must be faced with energy and imagination, and by the other services and the civilian ministries as well as by the Navy, appears to be beyond dispute, since the continued existence of our country is plainly at stake. With the introduction of atomic weapons an era has passed. The crossroads at which we stand were made plain at Bikini for all to see.

"EYEWITNESS."



H.M. Destroyer Aisne.
(Courtesy of Messrs. Vickers-Armstrong.)



H.M. Sloop Peacock.

(Courtesy of Messrs. Thornycroft.)

REFERENCE SECTION.

DIMENSIONS AND PARTICULARS OF BRITISH AND FOREIGN WARSHIPS.

Warships are arranged in classes, except in some instances where they are arranged alphabetically. The following abbreviations are used throughout the List:—

a.g.b. Armoured gunboat.	A.T. Aircraft tender.
g.b. Gunboat.	M.C. Escort Carrier.
b. Battleship.	S.C. Seaplane carrier.
b.c. Battle cruiser.	H.N.S. Harvey nickel steel.
l.c.r. Light cruiser.	H.S. Harveyised or similar hard-faced steel.
c.d.s. Coast-defence ship.	K.S. Krupp steel.
A.M.Cr. Armed Merchant cruiser.	t. Speed and H.P. at trials (in speed and H.P. columns).
M.Cr. Minelaying cruiser.	b.p. Length of ship between perpendiculars.
or. Cruiser.	
A.A. or H.A. Anti-aircraft guns.	
A.C. Aircraft carrier.	
L.A.C. Light Aircraft carrier.	
l. Light guns under 15 cwt., including boats' guns.	
m. Machine guns.	
m.p.p. Multiple pom poms.	
Torpedo Tubes; (D.) = double; (T.) = triple; (Q.) = quadruple; (sub.) = submerged; a.w. = above water.	

The following abbreviations are used to distinguish the various types of boilers:—

W.T. Water-tube boilers, where the type is not known.	I. Indret.
A. Ansaldo.	K. Kanpon.
B. Belleville.	My. Miyabara.
Bl. Blechynden.	Nic. Niclausse.
B. & W. Babcock and Wilcox.	Pen. Penhoet.
D'A. D'Allest.	T. Thornycroft.
G. Guyot.	T.S. Thornycroft-Schulz.
	W.F. White-Forster.
Y. Yarrow.	

The following abbreviations distinguish types of machinery:—

P.T. Parsons turbines.	tur. Turbines, where the type is not known.
C.T. Curtis turbines.	R. Steam reciprocating engines.
B.C.T. Brown-Curtis turbines.	I.C. Internal combustion engines.
(G.) Geared turbines.	W.G.T. Westinghouse geared turbines.
D. Diesel.	
Rat. Rateau.	

In later pages (marked P1, P2, etc., towards the end of the volume) plans of most of the ships appear.

Unless otherwise stated, the displacements are Standard displacements (i.e. deep less fuel and reserve feed water).

GREAT BRITAIN—BATTLESHIPS AND BATTLE CRUISERS.

Class	NAME	Standard Displacement	Length (extreme)	Beam (extreme)	Normal draught	Horse power Type of boilers	Where built	Makers of engines Type of machinery	Date of launch	Cost	Armour						Armament		Speed	Complement (war)
											Belt	Deck	Side above belt	Bulkhead	Gun Position		Guns	Torpedo tubes		
b.	Vanguard	tons 42,500	ft. 814	ft. in. 108 0	ft. in. 28 0	130,000	Brown	Brown P.T.(G.)	1914	£	in.	in.	in.	in.	in.	in.	8 15-in., 16 5.2-in., about 70/40 mm. A.A. guns.	Nil	knots 28+	1500
b.	King George V	35,000	745	103 0	28 0	110,000	Vickers (Walker)	Vickers P.T.(G.)	1939	1941							10 14-in., 16 5.25-in., many light A.A. guns.		28+	
b.	Duke of York	"	"	"	"	"	Brown	Brown P.T.(G.)	1939	1941							"	"	"	"
b.	Howe	"	"	"	"	"	Fairfield	Fairfield P.T.(G.)	1940	1942							"	"	"	"
b.	Anson	"	"	"	"	"	Swan Hunter	Wallsend P.T.(G.)	1940	1942							"	"	"	"
b.	Nelson	33,950	710	106 0	30 0	45,000	N'w'sle- on-Tyne	Wallsend B.C.T.(G.)	1925	1927	14	6½			16-9		9 16-in., 12 6-in., 6 4.7- in. A.A.; many light A.A. guns.	2 (sub.) 24"	23	1380
b.	Rodney	"	"	"	"	"	Birkenhead	Cannell Laird	1925	1927	"	"			"		"		1315	
b.	Hamillies†	29,150	620½	102 0	29 0	40,000	Dalmuir	Beardmore, P.T.	1916	1917	13-4	4-1	6	6-4	11	6	8 15-in., 12 6-in., 4 3-pr. 2 2-pr. m.p.p.; 8 4-in. A.A.; many light A.A. guns.	2 (sub.) 21"	23½	1010
b.	Resolution	"	620½	101 4	"	"	Jarrow	Palmer, P.T.	1915	1916	"	"	"	"	"	"	"	"	"	1012
b.	Revenge	"	625½	101 5	"	"	Barrow	Vickers P.T.	1915	1916	"	"	"	"	"	"	"	"	"	1104
b.	Royal Sovereign*	"	620½	101 6	"	"	Portsmouth	Parsons P.T.	1915	1916	"	"	"	"	"	"	"	"	"	

b.	Malaya †	31,100	640‡	104 0 31 3	75,000 B. & W.	Walker	Walleend P.T.	19151916	2,945,709	13-6	3-1	6	4-3	11	6		25||	1186
b.	Valiant §	31,100	639‡	104 0 31 3	80,000 B. & W.	Govan	Fairfield B.C.T.	19141916	2,537,037	13-6	3-1	6	4-2	11	6	8 15-in., many guns.	25||	1186
b.	Queen Elizabeth §	31,100	644‡	104 0 31 3	80,000 B & W.	Ports- mouth	Walleend P.T.	19131915	2,473,103	13-4	3-1	6	4-2	11	6	8 15-in., 20 4.5-in., 4 2- 77; m.p.p.; many light A.A. guns.	25||	1187
b.c.	Renown	32,000	794‡	102 4 31 0	120,000	Govan	Fairfield B.C.T.	19161916	3,117,204	9-3 Σ.C.	2	6-3	4-3	11-7 Σ.C.	6	6 15-in.; 20 4.5-in. A.A.; many light A.A. guns; catapult and 4 aircraft.	2 21' 31-5||	1188

* On loan to Soviet Navy—renamed Archangel.

‡ Over rubbers.

§ Built at the charge of the Federated Malay States.

† Armament has been removed.

|| Speed without bulges.

§ Renown modernised in 1939.

Valiant " 1939.

Queen Elizabeth " 1940.

GREAT BRITAIN.—AIRCRAFT CARRIERS.

Class	NAME	Stand- ard dis- place- ment	Length (ex- treme)	Ex- treme breadth under water rubbers	Draught	Horse- power Type of boiler	Where built	Maker of engines Type of machinery	Date of launch	Date of com- ple- tion	Cost	Armour		Armament		Com- ple- ment (war)
												Belt Deck	Gun posi- tion	Guns	Tor- pedo tubes	
A.C.	Eagle	tons	ft.	ft. in.	ft. in.		Harland & Wolff (Belfast)	Harland & Wolff	1946		£	in.	in.	16 4.5-in. guns		knots
A.C.	Ark Royal						Cammell Laird	Cammell	Bldg.					"		32
A.C.	Indefatigable	23,000	760	95 9	22 4	140,000	Brown Fairfield	Brown Fairfield	1942	1944				16 4.5-in. guns.		33
A.C.	Illustrious	23,000	740	95 9	22 4	111,000	Vickers (Barrow)	Vickers (Barrow)	1939	1940				"		"
A.C.	Victorious	"	"	"	"	"	Vickers (Walker)	Vickers (Walker)	1939	1941				16 4.5-in. guns; 20 smaller.		30½
A.C.	Formidable	"	"	"	"	"	Harland & Wolff	Harland & Wolff	1939	1940				"		"
A.C.	Indomitable	"	"	"	"	"	(Belfast)	(Belfast)	1940	1941				"		"
A.C.	Argus	14,000	567	75 9	21 0	20,000	Vickers (Barrow)	Vickers (Barrow)	1917	1918	Purchased under con- struction			"		"
A.C.	Furious	22,450	786½	90 1½	21 6	90,000 Y.	Walker (Arm- strong)	Wallsend Eng'g Co. B.C.T.(G)	1916	1925		3	7	4 3-pr., 4 M., 10 L., accommodates 20 aircraft.	—	20
Colossus Class	Colossus *	14,000	665	80 0	23 0	40,000 P.T.(G.)	Vickers (Walker)	Vickers	1943	1944				12 4-in. A.A., 4 2-pr., m.p.p.; 46 smaller, 33 aircraft	—	30
"	Vengeance	"	"	"	"	"	Hunter	Wallsend	1944	1945				6 m.p.p.; a number of light A.A. guns.		25
"	Venerable	"	"	"	"	"	Cammell Laird	Cammell Laird	1944	1945				"		"

GREAT BRITAIN.—CRUISERS.

Class	NAME	Stand- ard dis- place- ment	Length (ex- treme)	Beam (ex- treme)	Draught	Horse- power. Type of machinery and boilers	Where built	Maker of engines	Date of launch	Date of com- ple- tion	Cost	Armour		Armament		Com- ple- ment (war)	
												Belt Deck	Gun posi- tion	Guns	Tor- pedo tubes		
Norfolk Class	Norfolk	tons 9925	ft. 633	ft. in. 66 0	ft. in. 17 0	80,000 P.T.(G.)	Fairfield	Fairfield	1928	1930	£ 2,141,961	in.	in.	6 8-in., 8 4-in. A.A., many light A.A. guns.	8 21" (Q.)	knots 32½	685
London Class	Sussex	9830	633	66 0	17 0	80,000 P.T.(G.)	Hawthorn Leslie	Hawthorn Leslie	1928	1929	1,975,800†			8 8-in., 8 4-in. A.A., many light A.A. guns.	8 21" (Q.)		685
Kent Class	Devonshire	9850	630	66 0	17 0		Devonport	Vickers	1927	1929	2,007,275			" "	" "		
	London	9850	630	66 0	17 0		Ports- mouth	Fairfield	1927	1929	1,966,559			" "	" "		
	Suffolk	10,000	630	68 4	16 7	80,000 (G.) Y.	Ports- mouth	Parsons	1926	1928	2,180,240†			8 8-in., 8 4-in. A.A., many light A.A. guns.	Nil	31½	700
	Berwick	"	"	"	"	"	Govan	Fairfield	1926	1928	2,029,526			" "	" "		
	Cumberland	"	"	"	"	"	"	Barrow	Vickers	1926	1928	2,960,821			" "	" "	
Improved South- ampton Class	Kent	"	"	"	"	"	Chatham	Hawthorn	1926	1928	2,084,213†			" "	" "		
	Belfast	10,000	613½	63 4	17 3	80,000 P.T.(G.)	Harland & Wolff	Harland & Wolff	1938	1939	2,176,731			12 6-in., 8 4-in. A.A., many smaller, 3 aircraft, 1 catapult.	6 21" (T)		32½

South- ampton Class	Liverpool	9400	591½	62 4	17 5	82,500 P.T.(G.)	Fairfield	Fairfield	1937	1938		9 6-in., 8 4-in. A.A., many smaller.	6 21" (T)	32	740
	Newcastle	9100	591½	61 8	17 0	75,000 P.T.(G.)	Vickers (Walker) Scotts	Vickers	1936	1937	1,980,000	"	"	"	"
	Glasgow	"	"	"	"	"	Scotts	Scotts	1936	1937	"	"	"	"	"
	Sheffield	"	"	"	"	"	Vickers (Walker)	Vickers	1936	1937	"	"	"	"	"
	Birmingham	"	"	"	"	"	Devonport	Brown	1936	1937	"	"	"	"	"
Tiger Class	Tiger	8000	"	"	"	"	Brown	Brown	1945	Bldg.	"	"	"	"	"
	Defence	"	"	"	"	"	Scotts	Scotts	1944	"	"	"	"	"	"
	Blake	"	"	"	"	"	Fairfields	Fairfields	1945	"	"	"	"	"	"
Swiftsure Class	—	8000	555½	63 0	16 3	72,500 P.T.(G.)	Vickers (Walker) Swan	Vickers	1943	1944	"	9 6-in., 10 4-in., 4 m.p.p., several smaller.	6 21" (T)	32	"
	Superb	"	"	"	"	"	Hunter	Walsend	1943	1945	"	"	"	"	"
Uganda Class	Carson	8000	555½	62 0	16 6	72,500 P.T.(G.)	Stephen	Stephen	1942	1943	"	9 6-in., 8 4-in. A.A., 16 smaller.	6 21" (T)	"	"
	Newfoundland	"	"	"	"	"	Swan Hunter	Walsend	1941	1943	"	"	"	"	"
Fiji Class	—	8000	555½	62 0	16 6	72,500 P.T.(G.)	Brown	Brown	1941	1942	"	9 6-in., 8 4-in., 16 smaller.	6 21" (T)	32	"
	Gambia	"	"	"	"	"	Swan	Walsend	1940	1942	"	(Gambia and Nigeria have 12 6-in. guns.)	"	"	"
	Jamaica	"	"	"	"	"	Hunter	Vickers	1940	1942	"	"	"	"	"
	Maritimes	"	"	"	"	"	Vickers	Walsend	1939	1941	"	"	"	"	"
	Kenya	"	"	"	"	"	Swan Hunter	Walsend	1939	1940	"	"	"	"	"
	Nigeria	"	"	"	"	"	Stephen	Stephen	1939	1940	"	"	"	"	"
	—	"	"	"	"	"	Vickers	Parsons	1939	1940	"	"	"	"	"
Arctura* Class	—	5270	508	51 0	13 10	64,000 P.T.(G.)	Porte- mouth	Walsend	1936	1937	1,233,921	6 6-in., 8 4-in. A.A., 9 smaller.	6 21" (T)	32½	500
	Arcturus	5220	"	"	"	"	Chatham	Parsons	1934	1935	1,280,463	"	"	"	"

* Reported to be sold to Chinese navy.

† Estimated cost, excluding armament and ordnance stores.

GREAT BRITAIN.—CRUISERS—continued.

Class	NAME	Stand- ard dis- place- ment	Length (ex- treme)	Beam (ex- treme)	Draught	Horse- power. Type of machinery and boilers	Where built	Maker of engines	Date of launch	Date of com- ple- tion	Cost	Armour		Armament		Tor- pedo com- ple- ment (war)
												Belt	Gun posi- tion	Guns	Speed knots	
Leander Class	Ajax*	tons 6985	ft. 554½	ft. in. 55 8	ft. in. 16 0	72,000 P.T.(G.)	Vickers	Vickers	1934	1935	£ 1,491,417	in.	in.	6 6-in., 8 4-in. A.A., many light A.A. guns. (8 6-in. in Orion.)	8 32½ 21" (Q.)	570
	Orion	7215	"	"	"	"	Devonport	Vickers	1932	1934	1,548,663	"	"	"	"	"
	Leander*	7270	"	55 2	"	"	"	"	1931	1933	1,667,819	"	"	"	"	"
	Achilles*	7030	"	"	"	"	Cammell Laird	Cammell Laird	1932	1933	"	"	"	"	"	"
D Class	Delhi	4850	—472½	—46 9	14 3	40,000 (G.) Y.	Armstrong	Wallsend	1918	1919	785,145	3	Shields	"	"	29 460
	Danaë	"	"	"	"	"	Armstrong	Wallsend	1918	1918	701,600	"	"	5 6-in., 2 4-in., 16 20- mm.	"	"
Hawkins Class	Frobisher	9860	605	65 1	17 3	65,000 B.C.T.(G.)	Devonport	Wallsend	1920	1924	2,035,915	3	Shields	3 7.5-in., 5 4-in. A.A., 2 2-pr., 2 M., 8 L.	4 21" (Q.)	715
	Hawkins	9800	"	65 1	"	55,000 P.T.(G.) Y.	Chatham	Parsons	1917	1919	1,599,741	"	"	7 7.5-in., many smaller.	29½	747
Carlisle Class	Colombo	4200	451½	43 10	14 1	40,000 (G.) Y.	Fairfield	Fairfield	1918	1919	692,308	3	"	2-6 4-in. guns.	29	415
	Carlisle	"	"	"	"	"	Fairfield	Fairfield	1918	1918	669,216	"	"	"	"	"
Caledon Class	Caledon	4180	450	43 1	14 1	40,000 P.T.(G.) Y.	Cammell Laird	Cammell Laird	1916	1917	547,300	3	"	6 4-in., 8 40-mm. A.A.	29	420
	Emerald	7550	570	54 7	16 8	80,000 B.C.(G.) Y.	Armstrong	Wallsend	1920	1926	1,617,120	3-1½ 1	"	7 6-in., 3 4-in. A.A., 2 2-pr. Pom Poms, 7 smaller.	8 21" (Q.)	577

Dido Class	Argonaut	5450	506	50 5	14 0	62,000 P.T.(G.)	Cammell Laird Fairfields	1941	1942		8 5-25-in. (Dido and Sirius have 10 5-25-in., and Scylla has 8 4-5-in.). many light A.A. guns.	6 21* (T)	33
	Bellona †	"	"	"	"	"	Fairfields	1942	1943		"	"	"
	Black Prince †	"	"	"	"	"	Harland & Wolff	1942	1943		"	"	"
	Cleopatra	"	"	"	"	"	Hawthorn	1940	1941		"	"	"
	Diadem	"	"	"	"	"	Hawthorn	1942	1944		"	"	"
	Dido	"	"	"	"	"	Cammell	1939	1940		"	"	"
	Euryalus	"	"	"	"	"	Laird Chatburn	1940	1941		"	"	"
	Phoebe	"	"	"	"	"	Fairfields	1939	1940		"	"	"
	Royalist	"	"	"	"	"	Scotts	1942	1943		"	"	"
	Scylla	"	"	"	"	"	Scotts	1940	1942		"	"	"
	Sirius	"	"	"	"	"	Scotts	1940	1942		"	"	"
M.Cr. Class	Adventure	6740	539	59 0	15 5	40,000 Tur. & Diesel	Ports- mouth Devonport	1924	1927	1,246,083	4 4-7-in., A.A., 4 3-pr., 4 2-pr. Pom Poms, 4 M., 8 L., 310 mines	28	700

* To transfer to the Royal Indian Navy.

† Transferred to Royal New Zealand Navy.

GREAT BRITAIN.—FLOTILLAS.

DESTROYERS.

Name or Number	Built by	Completed	Dimensions			Number of screws	Standard displacement	Horse-power	Mean speed on trial, or expected	Armament	Torpedo tubes	Complement (war)
			Length (extreme)	Beam	Draught							
DESTROYERS— <i>Daring Class :</i>		Bldg.	Feet	Feet	Feet		Tons 2620		Knots	6 4·5-in.		
<i>Weapon Class :</i>												
Battleaxe	Yarrow	Bldg.				2	1980	40,000		4-in. HA/LA in twin mount- ings	10 21" (P)	
Broadsword	Yarrow	"										
Crossbow	Thornycroft	"										
Scorpion	White	"										
<i>Battle Class :</i>												
Agincourt (Ldr.)	Hawthorn Leslie	Bldg.				2	2325	59,000		40 mm. 4 4·5-in. in twin mount- ings	10 21" (P)	
Alamein (Ldr.)	Hawthorn Leslie	1947					2315					
Aisne	Vickers (Walker)	"										
Barrosa	Brown	"										
Corunna	Swan Hunter	"								1 4·5-in. single, many 40 mm.		
Dunkirk	Stephen	"										
Jutland	"	"										
Matapan	Brown	Bldg.										
Armada (Ldr.)	Hawthorne Leslie	1945				2	2325	59,000	36	4 4·5-in. 12 40 mm.	8 21" (Q)	
Saintes (Ldr.)	"	1946										
Solebay	"	1945					2315					
Cadiz	Fairfields	1946										
St. James	"	"										
Vigo	"	"										
Gravelines	Cammell Laird	"										
Sluys	"	"										
Trafalgar (Ldr.)	Swan Hunter	1945				2	2325	59,000	36	4 4·5-in. 12 40 mm.	8 21" (Q)	
Barfleur (Ldr.)	"	1946					2315					
St. Kitts	"	"										
Gabbard	"	"										
Lagos	Cammell Laird	1945										
Hogue	"	"										
Finisterre	Fairfield	"										
Camperdown	"	"										
* <i>Crescent Class :</i>												
‡ Crescent (Ldr.)	Brown	1945	362½	35½	10	2	1710	40,000	37	4 4·5-in.	4 21" (Q)	
‡ Crusader	White	1946										
Crispin	"	"										
Creole	"	"										
<i>Cossack Class :</i>												
Cossack (Ldr.)	Vickers (Walker)	1945	"	"	"	"	"	"	"	"	"	
Cockade	Yarrow	"										
Comet	"	"										
Constance (Ldr.)	Vickers (Walker)	"										
Comus	Thornycroft	1946										
Concord	"	"										
Co. test	White	1945										
Consort	Stephen	1946										
<i>Chequers Class :</i>												
Chequers (Ldr.)	Scott	1945	"	"	"	"	"	"	"	"	"	
Chaplet	Thornycroft	"										
Chevron	Stephen	"										
Chieftain (Ldr.)	Scott	1946										
Charity	Thornycroft	1945										
Cheviot	Stephen	"										
Childers	Denny	"										
Chivalrous	"	1946										
<i>Cæsar Class :</i>												
Cavendish (Ldr.)	Brown	1944	"	"	"	"	"	"	"	"	"	8 21" (Q)
Cæsar (Ldr.)	"	"										
Carysfort	White	1945										
Carron	Scott	"										

* Remaining four vessels of Crescent Class sold to Norway.

‡ On loan to Royal Canadian Navy.

Great Britain—*continued.*

Name or number	Built by	Completed	Dimensions			Number of screws	Standard displacement	Horse-power	Mean speed on trial, or expected	Armament	Torpedo tubes	Complement (war)
			Length (extreme)	Beam	Draught							
DESTROYERS—<i>contd.</i>			Feet	Feet	Feet		Tons		Knots			
<i>Cæsar Class—contd.</i>												
Cavaller	White	1945	362½	35½	10	2	1710	40,000	37	4 4·5-in.	8	
Cassandra	Yarrow	"									21"	(Q)
Caprice	"	"										
Cambrian	Scott	"										
Zambesi Class :												
Zephyr (Ldr.)	Vickers (Walker)	1944	"	"	"	"	"	"	"	"	"	"
Myngs (Ldr.)	Denny "	"										
Zenith	Thornycroft	1945										
Zodiac	Denny "	"										
Zebra	Cammell Laird	"										
Zealous	"	"										
Zambesi	Thornycroft	1945										
Zest	"	"										
Wager Class :												
Kempenfelt (Ldr.)	Brown	1943	"	"	"	"	"	"	"	4 4·7-in.	"	
Whirlwind	Hawthorn Leslie	1944										
Wrangler	Vickers (Barrow)	"										
Wessex	Fairfields	"										
Whelp	Hawthorn Leslie	"										
Wager	Brown	"										
Wizard	Vickers (Barrow)	"										
Wakeful	Fairfield	"										
Valentine Class :												
Volage	White	1944	"	"	"	"	"	"	"	4 4·7-in.	"	
Verulam	Fairfield	1943								1 m.p.p.		
Virago	Swan Hunter	"								or twin		
Vigilant	"	"								40 mm.		
Venus	Fairfield	"										
Ulster Class :												
Grenville (Ldr.)	Swan Hunter	1943	"	"	"	"	"	"	"	"	"	
Ulster	"	"										
Ulysses	Cammell Laird	"										
Undaunted	"	1944										
Undine	Thornycroft	1943										
Urania	Vickers (Barrow)	1944										
Urchin	"	1943										
Ursa	Thornycroft	1944										
Troubridge Class :												
Troubridge (Ldr.)	Brown	1943	"	"	"	"	"	"	"	"	"	
Teazer	Cammell Laird	"										
Tenacious	"	"										
Termigant	Denny "	"										
Terpsichore	"	"										
Tumult	Brown	"										
Tuscan	Swan Hunter	"										
Tyrian	"	"										
*Saumarez Class :												
Saumarez (Ldr.)	Hawthorn Leslie	1943	"	"	"	"	"	"	"	"	"	
Savage	"	"										
Rotherham Class :												
Rotherham (Ldr.)	Brown	1942-43	358½	"	"	"	"	"	"	"	"	
Racehorse	"	"										
Raider	Cammell Laird	"										
Rapid	"	"										
Redoubt	Brown	"										
Relentless	"	"										
Rocket	Scotts	"										
Roebuck	"	"										
Quilliam Class :												
†Queenborough	Swan Hunter	1942	"	"	"	"	"	"	"	"	"	
†Quadrant	Hawthorn Leslie	"										
†Quality	Swan Hunter	"										
†Quickmatch	White	"										
†Quiberon	"	"										

* Scourge, Scorpion and Serapis are with Netherlands Navy, and Stord with the Norwegian Navy.

† On loan to Royal Australian Navy. Quilliam of this class is now H. Neth M.S. Banckert.

Great Britain—continued.

Name or Number	Built by	Completed	Dimensions			Number of screws	Standard displacement	Horse-power	Mean speed on trial, or expected	Armament	Torpedo tubes	Complement (war)
			Length (extreme)	Beam	Draught							
DESTROYERS—contd.			Feet	Feet	Feet		Tons		Knots			
<i>Pakenham Class :</i>												
Paladin	Brown	1941-42	345	35	9	2	1540	..	..	4 4-in. 1 m.p.p.	8 21" (Q)	
Pathfinder	Hawthorn Leslie											
Penna	Vickers (Walker)											
Petard	" "											
<i>*Onslow Class :</i>												
Onslow (Ldr.)	Brown	1941-42	"	"	"	"	"	..	..	4-in. or 4·7-in. 1 m.p.p.	8 21" (Q)	
Obdurate	Denny											
Obedient	Denny											
Offa	Fairfield											
Onslaught	Fairfield											
Opportune	Thornycroft											
Orwell	Thornycroft											
<i>Napier Class :</i>												
Napier (Ldr.)	Fairfield	1940	356	35½	"	"	1760	40,000	36	6 4·7-in. 1 m.p.p.	21"	
Nepal	Thornycroft	1942										
Nizam	J. Brown	1941										
Norman	Thornycroft	"										
Noble (ex-Piorun)	J. Brown	1940										
<i>Milne Class :</i>												
Milne (Ldr.)	Scotts	1942	362	37	10	2	1935	48,000	36·0	6 4·7-in., 1 4-in. A.A. 1 m.p.p.	8 21"	
Marne	Vickers	1941					1920					
Matchless	Stephen	1942					"					
Meteor	"	"					"					
Musketeer	Fairfield	"					"					
<i>Laforey Class :</i>												
Lookout	Scotts	1942	"	"	"	"	"	"	"	6 4·7-in. 1 m.p.p.	8 21"	
Loyal	"	"										
<i>Kelly Class :</i>												
Kelvin	Fairfield	1939	356	35½	9	2	1760	40,000	36·0	6 4·7-in. 1 m.p.p.	10 21"	
Kimberley	Thornycroft	"										
<i>Javelin Class :</i>												
Javelin	Brown	1939	"	"	"	"	"	"	"	6 4·7-in. 1 m.p.p.	10 21"	
Jervis (Ldr.)	Hawthorn Leslie	"										
<i>Tribal Class :</i>												
Ashanti	Denny	1938	377	36½		2	1870	44,000	36·5	6 4·7-in., 2 4-in. 1 m.p.p.	4 21" (Q)	200
Eskimo	Vickers	"										
Nubian	Thornycroft	"										
Tartar	Swan Hunter	1939										
† Bataan	Cockatoo	1945										
† Arunta	"	1942										
† Warramunga	"	"										
† Haida	Vickers	1943										
† Huron	"	"										
† Iroquois	"	1942										
† Micmac	Halifax Shipyards	1945										
† Nootka	"	1946										
<i>Intrepid Class :</i>												
Ilex	Brown	1937	323	33	8½	2	1370	34,000	36	4 4·7-in., 6 smaller	10 21"	145
<i>Havant Class :</i>												
Hesperus	Thornycroft	1940	323	33	8½	2	1400	34,000	35	2 4·7-in., 4 smaller	4 21"	145
<i>Hero Class :</i>												
Hotspur	Scotts	1936	323	33	8½	2	1340	34,000	36	3 4·7-in., 6 smaller	8 21"	145
<i>Greyhound Class :</i>												
Garland	Fairfield	1936	323	33	8½	2	1335	34,000	36	3 4·7-in., 6 smaller	8 21"	145
<i>Fearless Class :</i>												
Fame	Vickers	1935	329	33½	8½	2	1350	36,000	36	3 4·7-in., 6 smaller	8 21"	145
† Qu'Appelle (ex-Foxhound)	Brown											
<i>Eclipse Class :</i>												
Escapade	Scotts	1936	329	33½	8½	2	1375	36,000	36	3 4·7-in., 6 smaller	4 21"	145
§ Navarion (ex-Enid)	Denny											
† Gatineau (ex-Expres)	Swan Hunter											

* Oribi of this class is now the Turkish Gayret.

† Royal Australian Navy.

‡ Royal Canadian Navy.

§ On loan to Royal Hellenic Navy.

Great Britain—continued.

Name or Number	Built by	Completed	Dimensions			Number of screws	Standard displacement	Horse-power	Mean speed on trial, or expected	Armament	Torpedo tubes	Complement (war)
			Length (extreme)	Beam	Draught							
DESTROYERS—contd.			Feet	Feet	Feet		Tons		Knots			
Beagle Class :												
*Brilliant	Swan Hunter	1931	323	32½	8½	2	1360	34,000	35½	3 4·7-in., 6 smaller	4 21"	140
*Salamis (ex-Boreas)	Palmer											
Acasta Class :												
Active	Hawthorn Leslie	1930	323	32½	8½	2	1350	34,000	35½	2 4·7-in., 6 smaller	8 21"	140
Anthony	Scotts											
Admiralty Design :												
Campbell (Ldr.)	Cammell Laird	1918	332½	31½	12½	2	1530	40,000	36½	2 4·7-in., 13-in. A.A. 6 smaller	6 21"	182
Mackay (Ldr.)	Cammell Laird	1919										
†Stuart (Ldr.)	Hawthorn Leslie	1918										
Thornycroft :												
Viceroy	Thornycroft	1918	312	30½	10	2	1120	30,000	35	4 4-in., 2 2-pr.		120
Admiralty "S" Class :												
Saladin	Stephen Brown	1919	276	26½	10½	2	905	27,000	36	3 4-in., 1 2-pr., 1 M., 4 L.	2 D. 21"	103
Scimitar		1918										
Admiralty "V" Class :												
Venomous	Brown	1919	312	29½	10½	2	1120	27,000	34	"V" Class is armed with 1 or 2 4-in. or 4·7-in. guns.	1 T.	130
Verity	Brown	1919										
Volunteer	Denny	1919										
Whitshed	Swan Hunter	1919										
Wivern	White	1919										
Wolverine	White	1920										
Windsor	Scott	1918									2 T.	120
Wolfhound	Fairfield	1918										
Westminster	Scott	1918									2 T. 21"	120
Vanessa	Beardmore	1918	312	29½	10·7	2	1100	27,000	34			
Vanity	Beardmore	1918										
Vidette	Stephen	1918										
Vimy (late Van-couver)	Beardmore	1918									1 T.	
Vanquisher	Brown	1917	312	29½	10½	2	1090	27,000	34		2 T. 1 T.	
Velox	Brown	1918									1 T.	
Versatile	Hawthorn Leslie	1917									2 T.	
Vesper	Stephen	1918									2 T.	
Vivacious	Yarrow	1917									2 T.	
Vivien	Yarrow	1918	312	29½	10·7	2	1090	27,000	34		1 T.	
Vega	Doxford	1917										
Valorous	Denny	1917										
Woolston	Thornycroft	1918										
Wolsey	Thornycroft	1918										
Thornycroft Type :												
Amazon	Thornycroft	1927	323	31½	9	2	1350	39,500	37	4 4·7-in., 2 2-pr., 1 M., 4 L.	2 T. 21"	140
Yarrow Type :												
Ambuscade	Yarrow	1927	322	31	8½	2	1170	33,000	37		5 21"	
Hunt Class :												
*Ægean (ex-Lauderdale)	Thornycroft	1941										
*Adrias (ex-Tanatside)	Yarrow	1942	280	31½	8	2	1000	19,000	27½	4 4-in. H.A. 1 m.p.p.	21"	..
Atherstone	Cammell Laird	1940										
Albrighton	Brown											
Aldenham	Cammell Laird	1942										
Avon Vale	Brown	1941										
Beaufort	Cammell Laird	1941										
Belvoir	Cammell Laird	1942										
Bedale	Hawthorn Leslie	1942										
Bicester	Hawthorn Leslie	1942										
Blackmore	Stephen	1942										
Blankney	Brown	1941										
Bleasdale	Vickers-Armstrong	1942										
Blencathra	Cammell Laird	1940										
Brecon	Thornycroft	1942	296	33	8	2	1175	19,500	27	6 4-in. H.A. 1 m.p.p.	21"	
Brissenden	Thornycroft	1941	296	33	8	2	1175	19,500	27	1 m.p.p.		
Brocklesby	Cammell Laird	1943	280	31½	8	2	1000	19,000	27½	4 4-in. H.A. 1 m.p.p.		
Calpe	Swan Hunter	1941										
*Admiral Hastings (ex Catterick)	Vickers-Armstrong	1942										

* On loan to Royal Hellenic Navy.

† Royal Australian Navy.

Great Britain—continued.

Name or Number	Built by	Completed	Dimensions			Number of screws	Standard displacement	Horse-power	Mean speed on trial, or expected	Armament	Torpedo tubes	Complement (war)
			Length (extreme)	Beam	Draught							
DESTROYERS—contd.			Feet	Feet	Feet		Tons		Knots			
<i>Hunt Class—contd.</i>												
Cattislock	Yarrow	1940	280	31½	8	2	1000	19,000	27½	4 4-in. H.A., 1 m.p.p.	21"	
Chiddingfold	Scotts	1940										
Cleveland	Yarrow	1940										
Cotswold	Yarrow	1940										
Cottesmore	Yarrow	1940										
Cowdray	Scotts	1942										
*Crete (ex-Hursley)	Swan Hunter	1942										
Croome	Stephen	1941										
Derwent	Vickers-Armstrong	1942										
Easton	White	1942										
Eglinton	Vickers-Armstrong	1940										
Eggesford	White	1943										
Eridge	Swan Hunter	1941										
Exmoor (ex-Burton)	Swan Hunter	1941										
Farndale	Swan Hunter	1941										
Ferne	Brown	1940										
Garth	Brown	1940										
Hambleton	Swan Hunter	1940										
Haydon	Vickers-Armstrong	1942										
Holderness	Swan Hunter	1940										
*Kanares (ex-Hatherleigh)	Vickers-Armstrong	1942										
Lamerton	Swan Hunter	1941										
Ledbury	Thornycroft	1942										
Liddesdale	Vickers-Armstrong	1941										
Melbreak	Swan Hunter	1942										
Mendip	Swan Hunter	1940										
Meynell	Swan Hunter	1940										
*Miaoules (ex-Modbury)	Swan Hunter	1942										
Middleton	Vickers-Armstrong	1942										
Oakley (ex-Tickham)	Yarrow	1942										
*Pindos (ex-Bolcbroke)	Swan Hunter	1942										
Pytchley	Scotts	1940										
Quantock	Scotts	1941										
Rockwood	Vickers-Armstrong	1942										
Silverton	White	1941										
Southdown	White	1940										
Stevenstone	White	1943										
Talybont	White	1943										
Tetcott	White	1941										
*Themistocles (ex-Bramham)	Stephen	1942										
Wensleydale	Yarrow	1942										
Whaddon	Stephen	1941										
Wheatland	Yarrow	1941										
Wilton	Yarrow	1942										
Zetland	Yarrow	1942										
<i>Town Class (ex-U.S.N.):</i>												
Chesterfield (ex-Wood)	Newport News	1919–	314·4	31	9·8	2	1190	25,000	35	4 4-in., 13-in. A.A.	4 Tri. 21"	122
Clare (ex-Upshur)	S.B. Co.	1920										
Broadway (ex-Hunt)												
Burnham (ex-Alden)	Bethlehem	1919	314·4	31	9·8	2	1190	27,000	35	4 4-in., 13-in. A.A.	4 Tri. 21"	122
Burwell (ex-Laub)												
Ramsey (ex-Meade)												
Castleton (ex-A. Ward)	Bath I.W.	1919– 1921	314·4	31	9·5	2	1090	24,000	35	4 4-in., 13-in. A.A.	4 Tri. 21"	122
Lancaster (ex-Phillip)												
Newport (ex-Sigourney)	Fore River	1918– 1920	314·4	31	9·8	2	1060	27,000	35	4 4-in., 13-in. A.A.	4 Tri. 21"	122
Charlestown (ex-Abbott)												
Newark (ex-Ringgold)	Newport News											
Leeds (ex-Connor)	Union I.W. Cramp	1918	315·5	30·7	9·5	3	1020	18,500	30	4 4-in., 13-in. A.A.	4 Tri. 21"	122

* On loan to Royal Hellenic Navy.

Great Britain—*continued.*

SUBMARINES.

Name or number	Where built	Completed	Dimensions			No. of screws	Displacement	Horse-power	Maximum speed	Armament	Torpedo tubes	Complement (war)
			Length (extreme)	Beam	Draught							
SUBMARINES—			Feet	Feet	Feet		Tons		Knots			
<i>A Class :</i>							1120 1600			1 4-in., 1 20-mm., 3 machine gns.		
Amphion	Vickers (Barrow)	1945										
Astute	"	"										
Auriga	"	1946										
Affray	Cammell Laird	"										
Aeneas	"	"										
Alaric	"	"										
Alcide	"	"										
Alderney	"	"										
Aurochs	"	"										
<i>Triton Class :</i>							1090 1575	2500 1450	15½ 9	1 4-in., 1 smaller	21"	53
Talent	Vickers (Barrow)	1945	275	26½	12	2						
Tapir	"	"										
Taciturn	"	1944										
Trump	"	"										
Tiptoe	"	"										
Thorough	"	"										
Telemachus	"	1943										
Tantivy	"	"										
Tantalus	"	"										
Truncheon	Devonport	1945										
Totem	"	"										
Thule	"	1944										
Tudor	"	"										
Tireless	Portsmouth	1945										
Turpin	Chatham	"										
Trenchant	"	1944										
Tradewind	"	1943										
Tallyho	Vickers (Barrow)	"										
Templar	"	"										
Truculent	"	"										
Tactician	"	1942										
Taurus	"	"										
Trespasser	"	"										
Truant	Vickers (Barrow)	1939										
Token	Portsmouth	1945										
Tabard	Scott	1946										
Thermopylae	Chatham	1946										
Teredo	Vickers (Barrow)	1946										
<i>1940 "S" Class :</i>							670 960	1550 1330	13½ 9	1 3-in., 1 smaller	21"	43
Sentinel	Scott	1946	215	24	10½	2						
Seneschal	"	1945										
Seadevil	"	"										
Scotsman	"	"										
Springer	Cammell Laird	1945										
Saga	"	"										
Sanguine	"	"										
Scorcher	"	"										
Spur	"	"										
Spearhead	"	"										
Sidon	"	1944										
Sleuth	"	"										
Solent	"	"										
Selene	"	"										
Seascout	"	"										
Supreme	"	"										
Subtle	"	"										
Stygian	"	"										
Sturdy	"	1943										
Statesman	"	"										
Spirit	"	"										
Storm	"	"										
Stoic	"	"										
Surf	"	"										
Scythian	Scott	1944										
Spark	"	"										
Spiteful	"	1943										
Sirdar	"	"										
Sea Rover	"	"										
Sceptre	"	"										
Satyr	"	"										

Great Britain—continued.

Name or number	Where built	Completed	Dimensions			No. of screws	Displacement	Horse-power	Maximum speed	Armament	Torpedo tubes	Complement (war)
			Length (extreme)	Beam	Draught							
SUBMARINES—			Feet	Feet	Feet		Tons		Knots			
1940 "S" Class—												
<i>contd.</i>												
Shallimar	Chatham	1944	215	24	10½	2	670	1550	13½	1 3-in., 1 smaller	21"	48
Sportsman	"	1943					960	1330	9			
Seanymp	Cammell Laird	1942										
Seadog	"	"										
Sibyl	"	"										
Seraph	"	"										
Unity Class :												
Vagabond												
* Triaina (ex-Volatile)	Vickers (Walker)	1945	196	16	13	2	540	615	11½	1 3-in., 3 smaller	4-6 21"	27
* Delphin	Vickers (Barrow)	1944					730	825	9			
* Argonaftis (ex-Virulent)	Vickers (Barrow)	"										
Varne	Vickers (Walker)	"										
Voracious	"	"										
† Doris	Vickers (Barrow)	"										
Urtica	"	"										
Upshot	"	"										
Visigoth	"	"										
Virtue	"	"										
Vigorous	"	"										
Vox	"	"										
Vampire	"	1943										
* Pipinos	"	"										
Vivid	Vickers (Walker)	1944										
Unswerving	"	1943										
Uther	"	"										
Varangian	"	"										
* Xifias	"	"										
* Amfitriti	Vickers (Barrow)	"										
P.67 (ex-LcCurie)	"	"										
Unseen	"	1942										
Unbending	"	1941										
Una	Chatham	"										
Ultimatum	Vickers	"										
P.97 (ex-Sokol)	"	"										

* On loan to Royal Hellenic Navy.

† On loan to French Navy.

Vessels of the Unity Class are serving with the following navies : French, Greek, Norwegian, Danish, Russian.

Great Britain—continued.

SLOOPS, FRIGATES, &c.

Name	Dis- place- ment	Length (extreme)	Beam (ex- treme)	Draught	Horse- power	Where built	Maker of machinery	Date of launch	Date of completion	Armament	Speed (knots)	Complement
SLOOPS—	tons	ft. in.	ft. in.	ft. in.								
<i>Modified Black Swan Class :</i>												
Actaeon	1400	299 6	38 6	9 0	4300 P.T. (G.)	Thornycroft	Thornycroft	1945 1946	1944 1945	6 4-in., 10 smaller	19½	..
Alacrity						Denny	Denny	1943 1943	1942 1943			
Amethyst						A. Stephen	A. Stephen	1942 1943	1941 1942			
Crane						Denny	Denny	1942 1943	1941 1942			
Cygnets						C. Laird	C. Laird	1942 1942	1941 1942			
Hart						A. Stephen	A. Stephen	1943 1943	1942 1943			
Hind						Denny	Denny	1943 1944	1942 1943			
Modeste						Chatham	Yarrow	1944 1945	1943 1944			
Opossum						Denny	Denny	1944 1945	1943 1944			
Magpie						Thornycroft	Thornycroft	1943 1943	1942 1943			
Mermaid						Denny	Denny	1943 1944	1942 1943			
Nereide						Chatham	Yarrow	1944 1946	1943 1944			
Peacock						Thornycroft	Thornycroft	1943 1944	1942 1943			
Pheasant						Yarrow	Yarrow	1942 1943	1941 1942			
Redpole						Yarrow	Yarrow	1943 1943	1942 1943			
Snipe						Denny	Denny	1945 1946	1944 1945			
Snipe						Denny	Denny	1946 1947	1945 1946			
Sparrow						Fairfield	Fairfield	1942 1943	1941 1942			
Starling						Yarrow	Yarrow	1942 1943	1941 1942			
Whimbrel						Yarrow	Yarrow	1942 1943	1941 1942			
Wild Goose						Fairfield	Fairfield	1942 1943	1941 1942			
Woodcock						Denny	Denny	1942 1943	1941 1942			
Wren												
<i>Black Swan Class :</i>												
Black Swan	1300	299 6	37 6	9 0	4300 P.T. (G.)	Yarrow	Yarrow	1939 1940	1940 1941	6 4-in., 10 smaller	19½	..
Erne						Furness	R. Westgarth	1940 1941	1939 1940			
Flamingo						Yarrow	Yarrow	1939 1939	1938 1939			
<i>Egret Class :</i>												
Pelican	1250	292 0	37 6	8 4	3600 P.T. (G.)	Thornycroft	Thornycroft	1938 1939	1937 1938	6 4-in., 10 smaller	19½	188
<i>Bittern Class :</i>												
Stork	1100	282 0	37 0	8 6	3300 P.T. (G.)	Denny	Denny	1936 1936	1935 1936	6 4-in., 3 smaller	18½	125
<i>Grimsby Class :</i>												
Aberdeen	990	266 0	36 0	7 6	2000 P.T. (G.)	Devonport	Thornycroft	1936 1936	1935 1936	2 4-in., 6 smal- ler	16½	100
Deptford						Chatham	J. S. White	1935 1935	1934 1935	2 4-in., 6 smaller		
Fleetwood						Devonport	Thornycroft	1936 1936	1935 1936	4 4-in., smaller		
Londonderry						Devonport	J. S. White	1935 1935	1934 1935	4 4-in., smaller		
<i>Repeat Shoreham Class :</i>												
Falmouth	1060	281 4	35 0	8 3	2000 P.T. (G.)	Devonport	H. Leslie	1932 1932	1932 1933	2 4-in. H.A., 4 smaller	16½	100
Weston						Devonport	Yarrow					
<i>Shoreham Class :</i>												
Bideford	1105	281 4	35 0	8 3	2000 (G.)	Devonport	J. S. White	1931 1931	1931 1932	2 4-in. H.A., 6 smaller	16½	100
Rochester						Chatham	J. S. White					
<i>Hastings Class :</i>												
Folkestone	1045	266 4	34 1	9 1	2000 P.T. (G.)	Swan Hunter	H. Leslie	1930 1930	1930 1930	1 4-in., 2 4-in.	16½	100
Scarborough						Swan Hunter	H. Leslie					
<i>Bay Class :</i>												
Cawsand Bay	1400	307 0	38 9		6500	Blyth Dry Dk.	J. S. White	1945 1945	1944 1945	4 4-in., 10 smal- ler	19½	..
Enard Bay						Smiths Dock	Smiths Dock	1944 1946	1943 1944			
Largo Bay						Pickersgill	Geo. Clark	1944 1946	1943 1944			
Tremadoc						Harland & Wolff	Harland & Wolff	1945 1945	1944 1945			
Bay						Henry Robb	Henry Robb	1945 1946	1944 1945			
Padstow Bay						Chas. Hill	Chas. Hill	1945 1946	1944 1945			
Porlock Bay						Harland & Wolff	Harland & Wolff	1945 1946	1944 1945			
Wigtown						Henry Robb	Henry Robb	1945 1945	1944 1945			
Bay						Chas. Hill	Chas. Hill	1945 1945	1944 1945			
Burghhead						Harland & W.	Harland & W.	1945 1945	1944 1945			
Bay						Harland & W.	Harland & W.	1945 1945	1944 1945			
Start Bay						Harland & W.	Harland & W.	1944 1945	1943 1944			
Whitesand						Harland & W.	Harland & W.	1944 1945	1943 1944			
Bay												
Bigbury Bay												

Great Britain—continued.

Name	Dis- place- ment	Length (extreme)	Beam (ex- treme)	Draught	Horse- power	Where built	Maker of machinery	Date of launch	Date of completion	Armament	Speed (knots)	Complement
FRIGATES (cont.)	tons	ft. in.	ft. in.	ft. in.								
<i>Bay Class—</i>												
<i>—contd</i>												
Cardigan Bay	1400	307 0	38 9		6500	Hall Russell	Hall Russell	1944	1945	4 4-in., 10	19½	...
St. Brides Bay						Henry Robb	Henry Robb	1944	1945	smaller		
St. Austell						Harland & W.	Harland & W.	1945	1945			
Bay												
Veryan Bay						Chas. Hill	Chas. Hill	1944	1945			
Widemouth						Harland & W.	Harland & W.	1944	1945			
Bay												
<i>Loch Class :</i>												
Loch	1445	307 0	38 6	..	6500	Henry Robb	Henry Robb	1944	1944	1 4-in., 10	19½	...
Achanalt										smaller		
Loch Alvie						Barclay Curle	Barclay Curle	1944	1944			
Loch						Chas. Hill	Chas. Hill	1944	1944			
Dunvegan												
Loch Fada						John Brown	John Brown	1943	1944			
Loch Killin						Burntisland	David Rowan	1943	1944			
Loch						Swan Hunter	Swan Hunter	1944	1944			
Morlich												
Loch Ruth- ven						Chas. Hill	Chas. Hill	1944	1944			
Loch Shin						Swan Hunter	Swan Hunter	1944	1944			
Loch Insh						Henry Robb	Henry Robb	1944	1944			
Loch Craggie						Harland & W.	Harland & W.	1944	1944			
Loch Eck						Smiths Dock	Smiths Dock	1944	1944			
Loch Fyne						Burntisland	David Rowan	1944	1944			
Loch Lomond						Caledon S.B. Co.	Caledon S.B. Co.	1944	1944			
Loch Gorm						Harland & W.	Harland & W.	1944	1944			
Loch Scaavaig						Chas. Hill	Chas. Hill	1944	1944			
Loch Katrine						Henry Robb	Henry Robb	1944	1944			
Loch Quoich						Blyth Dry Dks	J. S. White	1944	1945			
Loch Achray						Smiths Dock	Smiths Dock	1944	1945			
Loch Tarbert						Ailsa S.B. Co.	Ailsa S.B. Co.	1944	1945			
Loch Glendhu						Burntisland	David Rowan	1944	1945			
Loch More						Caledon S.B. Co.	Caledon S.B. Co.	1944	1945			
Loch Tralaig								1945	1945			
Loch Killi- sport						Harland & W.	Harland & W.	1944	1945			
Loch Arkaig						Caledon	Caledon	1945	1945			
Loch Veyatie						Ailsa S.B. Co.	Ailsa S.B. Co.	1945	1946			
<i>*River Class :</i>												
Avon	1445	303 0	36 6	12 0	6500 (R) some T.G.	Chas. Hill	Chas. Hill	1943	1943	2 4-in., 8 smal- ler	20	...
Awe						Fleming & Ferguson	Fleming & Ferguson	1943	1944			
Ballinderry						Blyth Dry Dk.	Hawthorne	1942	1943			
Chelmer						Geo. Brown	C. A. Parsons	1943	1943			
Dart						Blyth Dry Dk.	Hawthorn Leslie	1943	1943			
Derg						Henry Robb	Henry Robb	1943	1943			
Dovey						Fleming & Ferguson	Fleming & Ferguson	1943	1944			
Ettrick						J. A. Crown	C. A. Parsons	1943	1943			
Exe						Fleming & Ferguson	Fleming & Ferguson	1942	1942			
Fal						Smiths Dock Co.	Smiths Dock Co.	1942	1943			
Halladale						A. & J. Inglis	C. A. Parsons	1944	1944			
Helford						Hall Russell	Hall Russell	1943	1943			
Helmsdale						A. & J. Inglis	C. A. Parsons	1942	1943			
Jed						Chas. Hill	Chas. Hill	1942	1942			
Kale						A. & J. Inglis	Hawthorn Leslie	1942	1942			
Lochy						Hall Russell	Hall Russell	1942	1942			
Meon												
Nene						Smiths Dock	Smiths Dock	1942	1943			
Nith						Henry Robb	Henry Robb	1942	1943			
Ness						Henry Robb	Henry Robb	1942	1942			
Odzani						Smith's Dock Co.	Smiths Dock Co.	1943	1943			
Plym								1943	1943			
Ribble						Blyth Dry Dk.	Geo. Clark	1943	1944			
Rother						Smiths Dock	Smiths Dock	1941	1942			

* Vessels of this class in service with R.A.N., R.C.N., R.I.N., S.A.N.F. and French Navy.

Great Britain—continued.

Name	Dis- place- ment	Length (ex- treme)	Beam (ex- treme)	Draught	Horse- power	Where built	Maker of machinery	Date of launch	Date of completion	Armament	Speed (knots)	Complement
FRIGATES (cont.) <i>*River Class— contd.</i>	tons	ft. in.	ft. in.	ft. in.								
Spey	1445	303 0	36 6	12 0	6500	Smith's Dock	Smith's Dock	1941	1941	2 4-in., 8 smaller	20	..
Swale						Chas. Hill	Chas. Hill	1942	1942			
Taff						Smiths Dock	Smiths Dock	1943	1944			
Tay						Chas. Hill	Chas. Hill	1942	1942			
Tavy						Hall Russell	Hall Russell	1943	1943			
Tees						Hall Russell	Hall Russell	1943	1943			
Teviot						Hall Russell	Hall Russell	1942	1943			
Towy						Smiths Dock	Smiths Dock	1943	1943			
Usk						"	"	1943	1943			
Waveney						"	"	1942	1942			
Wear						"	"	1942	1942			
Wye						Henry Robb	Henry Robb	1942	1943			
CORVETTES— Castle Class :												
Allington Castle	1100	252 0	36 8	..	2380 (R)	Fleming & Ferguson	Fleming & Ferguson	1944	1944	1 4-in. several smaller	18½	..
Alnwick Castle						Geo. Brown	Kinkaid	1944	1944			
Amberley Castle						S. P. Austin	Geo. Clark	1943	1944			
Bamborough Castle						John Lewis	John Lewis	1944	1944			
Berkeley Castle						Barclay Curle	Barclay Curle	1943	1943			
Calstoe Castle						John Lewis	John Lewis	1944	1944			
Carisbrooke Castle						Caledon S.B. Co.	Caledon S.B. Co.	1943	1943			
Dumbarton Castle						"	"	1943	1944			
Farnham Castle						John Crown	Geo. Clark	1944	1945			
Flint Castle						Henry Robb	Henry Robb	1943	1943			
Hadleigh Castle						Smiths Dock Co.	Smiths Dock Co.	1943	1943			
Heddingham Castle						John Crown	Geo. Clark	1944	1945			
Kenilworth Castle						Smiths Dock Co.	Smiths Dock Co.	1943	1943			
Knares- borough Castle						Blyth Dry Dk.	J. S. White	1943	1944			
Lancaster Castle						Fleming & Ferguson	Fleming & Ferguson	1944	1944			
Launceston Castle						Blyth Dry Dk.	J. S. White	1943	1944			
Leeds Castle						Wm. Pickers- gill	Geo. Clark	1943	1944			
Morpeth Castle						"	"	1943	1944			
Oakham Castle						A. & J. Inglis	Harland & W.	1944	1944			
Oxford Castle						Harland & W.	"	1943	1944			
Pevensey Castle						"	"	1944	1944			
Portchester Castle						Swan Hunter	Swan Hunter	1943	1943			
Rushen Castle						"	"	1943	1944			
Tintagel Castle						Ailsa S.B. Co.	Ailsa S.B. Co.	1943	1944			
† Floer Class :												
Anemone	1000	205 0	33 2	13 6	2750	Blyth	Geo. Clark	1940	1940	1 4-in., 4 smaller	16	78- 85
Balsam						G. Brown	Geo. Clark	1942	1942			
Bryony						Harland & W.	Harland & W.	1941	1942			
Campion						J. Crown	N. E. Marine	1941	1941			
Campanula						Fleming & F.	Fleming & F.	1940	1940			
Carnation						Grangemouth	N. E. Marine	1940	1941			
Celandine						"	Ailsa	1940	1941			
Clarkia						Harland & W.	Harland & W.	1940	1940			
Clematis						C. Hill	Richardsons	1940	1940			
Convolvulus						G. Hill	Richardsons	1940	1941			

* Vessels of this class in service with R.A.N., R.C.N., R.I.N., S.A.N.F. and French Navy.

† Vessels of this class are serving with the R.C.N., R.N.Z.N., R.I.N., and the Greek, French, Norwegian, Chinese and Sinoann navies.

Great Britain—continued.

Name	Dis- place- ment	Length (extreme)	Beam (ex- treme)	Draught	Horse- power	Where built	Maker of machinery	Date of launch	Date of completion	Armament	Speed (knots)	Complement
CORVETTES— <i>contd.</i>	tons	ft. in.	ft. in.	ft. in.								
† <i>Flower Class—</i> <i>contd.</i>												
Cowslip	1000	206 0	32 2	13 6	2750	Harland & W.	Harland & W.	1941	1941	1 4-in., 4 smal- ler	16	78- 85
Delphinium						H. Robb	Ailsa	1940	1940			
Genista						Harland & W.	Harland & W.	1941	1941			
Gloxinia						"	"	1940	1940			
Godetia						J. Crown	N. E. Marine	1941	1942			
Heather						Harland & W.	Harland & W.	1940	1940			
Hyderabad						A. Hall	A. Hall	1941	1942			
Honeysuckle						Ferguson	Ferguson	1940	1940			
Jasmine						"	"	1941	1941			
La Malouine						Smith's Dock	"					
Lotus						H. Robb	Ailsa S.B. Co.	1942	1942			
Meadowsweet						C. Hill	Geo. Clark	1942	1942			
Monkshood						Fleming & F.	Fleming & F.	1941	1941			
Pennywort						A. & J. Inglis	Kinkaid	1941	1942			
Pimpernell						Harland & W.	Harland & W.	1940	1941			
Rock Rose						C. Hill	Geo. Clark	1941	1941			
Saxifrage						"	Geo. Clark	1941	1942			
Armeria						Harland & W.	Harland & W.	1941	1941			
Bittersweet						Marine Indus.	J. Inglis	1940	1941			
Burdock						J. Crown	N. E. Marine	1940	1941			
Dahlia						J. Lewis	J. Lewis	1940	1941			
Hepatica						Davie S.B. Co.	Dom. Eng. Co.	1940	1941			
Mayflower						Canadian Vickers	Canadian Vickers	1940	1941			
Snowberry						Davie S.B. Co.	Dom. Eng. Co.	1940	1941			
Sunflower						Smith's Dock	Smith's Dock	1940	1941			
Tulip						"	"	1940	1940			
Verbena						"	"	1940	1940			
Violet						W. Simons	W. Simons	1940	1941			
Guillemot Class:												
Guillemot	580	233 0	25 6	6 6	3600	Denny	Denny	1939	1939	1 4-in., 4 smal- ler	20	60
Shearwater					P.T. (G.)	J. S. White	J. S. White	1939	1939			
Kingfisher Class:												
Kingfisher	530	243 0	26 6	6 6	3600	Fairfield	Fairfield	1935	1935	1 4-in., 4 smal- ler	20	60
Mallard					P.T. (G.)	Stephen	Stephen	1936	1936			
Puffin						Stephen	Stephen	1936	1936			
Widgeon						Yarrow	Yarrow	1938	1938			
MINESWEEPERS Algerine Class:												
Acute	950	225 0	35 6	10 6	2000	Harland & W.	Harland & W.	1942	1942	1 4-in. H.A., 8 20-mm. (some have 40-mm. also)	16½	..
Albacore						"	"	-45	-45			
Antares						Toronto S.B. Co.	Montreal Loco					
Arcturus						Redfern	"	1942	1945			
Aries						Toronto S.B. Co.	"	1942	1943			
Bramble						Lobnitz	Lobnitz	1945	1945			
Brave						Blyth Dry Dk.	J. S. White	1943	1943			
Cadmus						Harland & W.	Harland & W.	1942	1942			
Chameleon						"	"	1944	1944			
Cheerful						"	"	1944	1944			
Circe						"	"	1942	1942			
Clinton						Toronto S.B. Co.	Montreal Loco	1942	1943			
Cockatrice						Fleming & F.	Fleming & F.	1942	1943			
Coquette						Redfern	Montreal Loco	1943	1944			
Courier						"	"	1943	1944			
Espiegle						Harland & W.	Harland & W.	1942	1942			
Fancy						Blyth Dry Dks	J. S. White	1943	1943			
Fantome						Harland & W.	Harland & W.	1942	1943			
Fierce						Lobnitz	Lobnitz	1945	1945			
Fly						"	"	1942	1942			
Flying Fish						Redfern	Montreal Loco	1944	1944			
Friendship						Toronto S.B.	"	1942	1943			
Golden Fleece						Redfern	Montreal Loco	1944	1944			
Hare						Harland & W.	Harland & W.	1944	1944			
Hound						Lobnitz	Lobnitz	1942	1942			
Hydra												

† Vessels of this class are serving with the R.C.N., R.N.Z.N., R.I.N., and the Greek, French, Norwegian, Chinese and Eireann Navies.

Great Britain—*continued.*

Name	Dis- place- ment	Length (extreme)	Beam (ex- treme)	Draught	Horse- power	Where built	Maker of machinery	Date of launch	Date of completion	Armament	Speed (knots)	Complement
MINESWEEPERS	tons	ft. in.	ft. in.	ft. in.								
— <i>contd.</i>												
<i>Algerine Class</i>												
— <i>contd.</i>												
Jaseur	950	225 0	35 6	10 6	2000	Redfern		1944	1944	1 4-in. H.A., 8	..	..
Jewel						Harland & W.	Harland & W.	1942	1942	to 12 20-mm.		
Laertes						Redfern		—45	—45	(some have		
Larne						Lobnitz	Lobnitz	1943	1943	40-mm. also)		
Lennox						"	"	1943	1944			
Liberty						Harland & W.	Harland & W.	1944	1945			
Lioness						Redfern	Montreal Loco	1944	1944			
Lysander						Port Arthur	"	1943	1944			
Magicienne						Redfern	"	1944	1945			
Maenad						"	"	1944	1944			
Mameluke						"	"	1944	1945			
Mandate						"	"	1944	1945			
Mariner						Port Arthur	Montreal Loco	1944	1945			
Marmion						Redfern	"	1944	1945			
Marvel						"	"	1944	1945			
Mary Rose						"	Montreal Loco	1943	1944			
Melita						"	"	1942	1943			
Michael						"	"	1944	1945			
Minstrel						"	"	1944	1945			
Moon						"	Montreal Loco	1944	1945			
Mutine						Harland & W.	Harland & W.	1943	1944			
Myrmidon						Redfern	"	1942	1943			
Mystic						"	"	1944	1945			
Nerissa						"	"	1944	1945			
Niger						Lobnitz	Lobnitz	1944	1945			
Octavia						Redfern	Montreal Loco	1945	1945			
Onyx						Harland & W.	Harland & W.	1942	1943			
Oreadia						Port Arthur	"	1944	1945			
Orestes						Lobnitz	Lobnitz	1942	1943			
Ossory						Port Arthur	"	1944	1945			
Pelorus						Lobnitz	Lobnitz	1943	1943			
Persian						Redfern	Montreal Loco.	1943	1943			
Pickle						Harland & W.	Harland & W.	1943	1943			
Pincher						"	"	1943	1943			
Plucky						"	"	1943	1943			
Pluto						Port Arthur	"	1944	1945			
Polaris						"	"	1944	1945			
Postillion						Redfern	Montreal Loco.	1943	1943			
Prompt						"	"	1944	1944			
Providence						"	"	1943	1944			
Pyrrihus						Port Arthur	"	1945	1945			
Rattlesnake						Lobnitz	Lobnitz	1943	1943			
Ready						Harland & W.	Harland & W.	1943	1943			
Recruit						"	"	1943	1944			
Rifleman						"	"	1943	1944			
Rinaldo						"	"	1943	1943			
Romola						"	"	1943	1943			
Rosamund						Collingwood	"	1944	1945			
Rosaria						"	"	1944	1945			
Rowena						Harland & W.	Harland & W.	1943	1943			
Seabear						Lobnitz	Lobnitz	1944	1944			
Serene						Redfern	Montreal Loco.	1943	1944			
Skipjack						"	"	1943	1944			
Spanker						Harland & W.	Harland & W.	1943	1943			
Stormcloud						Lobnitz	Lobnitz	1943	1944			
Sylvia						"	"	1944	1944			
Tanganyika						"	"	1944	1944			
Thisbe						Redfern	Montreal Loco.	1943	1944			
Truelove						"	"	1943	1944			
Wave						Lobnitz	Lobnitz	1944	1944			
Welcome						"	"	1944	1945			
Waterwitch						"	"	1943	1943			
Welfare						Redfern	Montreal Loco.	1943	1944			
Bangor Class :												
Ardrissan	600—	170—	28 6	9 6	2000	Blyth	White	1941	1942	1 3-in. H.A.,	16½	..
Bayfield	700	180 0			P.T.	North Van.	Allis Chalmers	1941	1942	several		
Beaumaris					(G.)	Ailsa	Ailsa	1940	1941	smaller		
Blyth					or	Blyth	White	1940	1941			
Bootle					2400	Ailsa	Ailsa	1941	1942			
Boston					R.	"	"	1940	1942			
Brixham						Blyth	White	1941	1942			
Canso						North Van.	Allis Chalmers	1941	1942			
Dornoch						Ailsa	Ailsa	1942	1942			
Dunbar						Blyth	White	1941	1942			
Eastbourne						Lobnitz	Lobnitz	1940	1941			

Great Britain—continued.

Name	Dis- place- ment	Length (extreme)	Beam (ex- treme)	Draught	Horse- power	Where built	Maker of machinery	Date of launch	Date of completion	Armament	Speed (knots)	Complement
MINESWEEPERS —cont'd. <i>Bangor Class—</i> <i>cont'd.</i>	tons	ft. in.	ft. in.	ft. in.								
Fort York	600—	170-0	28 6	9 6	2000	Dufferin	Montreal Loco.	1941	1942	1 3-in. H.A.,	16½	..
Fraserburgh	700	180			P.T.	Lobnitz	Lobnitz	1940	1941	several		
Ilfracombe					(G.)	White	White	1941	1941	smaller		
Ingonish					or	North Van.	Allis Chalmers	1941	1942			
Llandudno					2400	Hamilton	White	1941	1942			
Lockport					R.	North Van.	Allis Chalmers	1941	1942			
Lyne Regis						Stephen	Stephen	1942	1942			
Parrsboro						Dufferin	Montreal Loco.	1941	1942			
Peterhead						Blyth	White	1940	1941			
Polruan						Ailsa	Ailsa	1940	1941			
Poole						Stephen	Stephen	1941	1941			
*Qualicum						Toronto	Montreal Loco.	1941	1942			
Rhyl						Lobnitz	Lobnitz	1940	1940			
*Romney						"	"	1940	1940			
Rothsay						Hamilton	J. S. White	1941	1941			
Rye						Ailsa	Ailsa	1940	1941			
Seaham						Lobnitz	Lobnitz	1941	1941			
Shippigan						Toronto	Montreal Loco.	1941	1942			
*Sidmouth						H. Robb	Plenty	1941	1941			
Stornoway						"	"	1941	1941			
Tadoussac						Toronto	Montreal Loco.	1941	1942			
Tenby						Hamilton	J. S. White	1941	1941			
Wedgeport						Toronto	Montreal Loco.	1941	1942			
Whitehaven						Philip	Philip	1941	1941			
Worthing						"	"	1941	1942			
<i>Halcyon Class :</i>												
Gleaner	815	245 0	33 6	7 6	1750	W. Gray	Central	1937	1938	1 4-in., several	17	80
Hazard					P.T.	W. Gray	Marine	1937	1937	smaller		
†Seagull					(G.)	Devonport	Central					
†Sharpshooter						Devonport	Marine	1937	1938			
Halcyon					1770	J. Brown	Richardsons	1938	1937			
Harrier					R.	Thornycroft	J. S. White	1933	1934			
							J. Brown	1933	1934			
							Thornycroft	1934	1934			
TWIN SCREW MINESWEEPERS:	710	231 0	28 7	9 0	2200	Ailsa	Ailsa	1918	1919	1 4-in., 1 12-	16	73
Albury					recip.	Ailsa	W. H. Allen	1919	1919	pr. A.A.		
Alresford						McMillan	Yarrow	1918	1919			
Sutton						Murdock &	Yarrow	1918	1919			
Saltash						Murray						
Selkirk						Murdock &	D. Rowan	1918	1919			
Ross						Murray						
Harrow						Lobnitz	Lobnitz	1919	1919			
						Eltringham	Wallsend	1918	1918			
Lydd						Fairfield	Slipway	1918	1919			
Pangbourne						Lobnitz	Fairfield	1917	1917			
RIVER GUN- BOATS—												
Locust	585	197 0	33 8	5 0	3800	Yarrow	Yarrow	1939	1940	2 4-in., many	17	..
					P.T.					smaller		
					(G.)							
Aphis	625	237 6	36 0	4 6	2000	Ailsa	Ailsa	1915	1915	2 6-in., 1 3-in.	14	55
					recip.					A.A., 1 2-pr.,		
										8 L.		
Cockchafer						Barclay	Barclay	1915	1916	2 6-in., 1 3-in.		
						Curle	Curle			A.A., 8 L.		
Scarab						Wood, Skin-	N.E. Marine	1915	1915	2 6-in., 1 3-in.		
						ner				A.A., 1 2-pr.,		
										8 L.		
Seamew	262	165 0	27 0	4 6	1370	Yarrow	Yarrow	1928	1928	2 3-in.	14	
					recip.							

* On loan to Norway.

† Converted to survey ships.

GREAT BRITAIN.—MISCELLANEOUS CRAFT.

- DESTROYER DEPOT SHIPS.**—Woolwich (1935), 8,750 tons, 15 knots, 4 4-in. A.A.; Tyne (1941), 11,000 tons, 8 4.5-in. A.A., 2 2-pr. m.p.p., 7,500 S.H.P., 17 knots.
- SUBMARINE DEPOT SHIPS.**—Maidstone (1936) and Forth (1939), 8,900 tons, 17 knots, 8 4.5-in., 4 3-pr.; Adamant, 12,500 tons, 17 knots, 8 4.5-in.; Wolfe (1943), 4 4-in.; Montclare (1945), 20,000 tons, 4 4-in.
- HEAVY REPAIR SHIPS.**—Resource (Vickers', 1930), 12,300 tons, 15 knots, armament 4 4-in. A.A.; Artifex, Ausonia, Alauda (1944–45), 19,000 tons, 12–20 20-mm.; Ranpura (1945), 18,200 tons, 12 20-mm.
- MISCELLANEOUS.**—Manxman (1941), Ariadne (1943), Apollo (1944), 2,650 tons, 40 knots, 6 4-in. Stonechat, Dabchick, Blackbird, Redshank, Ringdove, Plover, 500–800 tons. Miner I–VIII, lighters.
- SURVEYING SHIPS.**—Challenger, 1,140 tons, 1,200 H.P. (recip.), 12½ knots; Franklin, 830 tons, 17 knots, 1 3-pr.; Scott (1939), 815 tons, 17 knots, 1 12-pr. A.A. Seagull, Sharpshooter, 815 tons, 17 knots, 1 4-in.
- NON-MAGNETIC SURVEY VESSEL.**—Research, building by Philip at Dartmouth. Sailing vessel. Aux. motor, 180 B.H.P., 770 tons, 6½ knots.
- NETLAYER AND TARGET TOWING VESSELS.**—Guardian (Chatham, 1931–3), 2,860 tons, 6,500 H.P., 18 knots, 2 4-in. A.A.; Protector (1934 programme), 2,900 tons, 20 knots, 1 4-in.
- BOOM DEFENCE VESSELS.**—Bayonet Class (1939), 10 in number, 600 tons, 11 knots, 1 3-in.; Barricade Class (1938–45), 70 in number, 750 tons, 12 knots, 1 3-in.; about 20 others.
- TRAWLERS.**—Professor Class (10), 400 tons, 500 H.P.; Round Table Class (6), 440 tons, 360 H.P. (D.); Mersey Class (1918), (6), 500 tons; Military Class (9), 800 tons, 1,000 H.P. (R.); Fish Class (7), 600 tons, 700 H.P. (R.); Hill Class (6), 750 tons, 970 H.P. (R.); Isles Class (130); Dance Class (20); Shakespeare Class (8), and Tree Class (20), 550 tons, 850 H.P. (R.) 12 knots.
- MOTOR TORPEDO BOATS.**—About 200 in number, 35–45 tons, 2 18-in. or 21-in. torpedoes. About 150 in number, 100 tons, 2 21-in. torpedoes.
- STEAM GUN BOATS.**—6 in number, 200 tons.
- MOTOR LAUNCHES.**—A large number, 110 ft., 18 knots and 72 ft., 12 knots.
- MOTOR MINESWEEPERS.**—40 in number, 126 ft., 350 tons, 10 knots. 150 in number, 105 ft., 250 tons, 12 knots About 100 B.Y.M.S., 300 tons, 1 3-in. gun.
- MONITORS.**—Erebus, 7,200 tons, 12 knots, 2 15-in., 8 4-in., 2 3-in. A.A.; 12 smaller guns. Roberts, Abercrombie, 8,000 tons, 2 15-in., 8 4-in., 12 knots.
- HOSPITAL SHIPS.**—Empire Clyde. 10 ex-merchant vessels.
- STORE SHIPS.**—Robert Dundas, Robert Middleton, Bacchus, Reliant.
- OIL TANKERS.**—Olna, Wave Regent, Wave Governor, Wave Emperor, Wave Monarch, Wave King, Empire Salvage (1941–5), 16,000–20,000 tons. Abbeydale, Armdale, Bishop Dale, Boardale, Cedarvale, Derwentdale, Dewdale, Dingledale, Eaglesdale, Easedale, Echodale, Ennerdale (1937–39), 11,500 tons D.W., 11½ knots. Okades, Olizarch Olsen and Olynthus, 9,000 tons D.W., 10½ knots. War Afridi, War Bharata, War Brahmia, War Hindoo, War Krishna, War Nizam, War Padman, War Pindari, War Sudra, 7,000 tons D.W., 11 knots. Appleleaf, Brambleleaf, Cherryleaf, Orangeleaf, Pearleaf (1917), 5,000 tons D.W., 15 knots. Belgol, Celerol, Mixel, Prestol, Rapdrol, Serbol, Thermol (1917), 2,000 tons D.W., 13½ knots. Boxol, Distol, Eldorol, Elmol, Hickorol, Kummerol, Larchol, Limol, Philol, Scotol, Viscol (1917), 1,000 tons D.W., 9 knots.
- LANDING SHIPS.**—(Dock) 4 in number; (Emergency Repairs) 5 in number; (Fighter Direction) 1 in number; (Stern Chute) 1 in number; (Tank) about 100 in number.
- AIRCRAFT REPAIR AND MAINTENANCE SHIPS.**—Unicorn (1943), 15,000 tons, 8 4-in., many smaller. Perseus, Pioneer (1945), 14,000 tons, many 20-mm. Holm Sound.
- MAINTENANCE SHIPS.**—Berry Head, Rame Head, Duncansby Head, Portland Bill, Cape Wrath, Derby Haven, Mull of Galloway.

DEFENCE FORCES OF THE DOMINIONS.

ROYAL AUSTRALIAN NAVY.

Class	NAME	Stand- ard dis- place- ment	Length (ex- treme)	Beam (ex- treme)	Draught	Horse- power. Type of machinery and boilers	Where built	Maker of engines	Date of launch	Date of com- pletion	Cost	Armour		Armament		Com- ple- ment (war)
												Belt	Gun posi- tion	Guns	Tor- pedo tubes	
Kent Class	Australia	tons 9870	ft. 630	ft. in. 68 4	ft. in. 16 3	80,000 P.C.	Brown	Brown	1927	1928	£	in.	in.	8 8-in., 8 4-in. A.A., 4 2-pr. m.p.p., 4 M., 12 L.	8 21" a.w. (Q.)	knots 31½
London Class	Shropshire	9830	633	66 0	17 0	(G.) Y.	Dalmuir	Beardmore	1928	1929	1,941,950					32½
Modified Leander Class	Hobart	7000	562	56 8	15 8	72,000 P.T. (G.)	Devonport	Beardmore	1934	1936	1,459,117			8 6-in., 8 4-in. A.A., 18 smaller.	8 21" (Q.)	32½
Adelaide Type Cruiser	Adelaide	5100	462½	50 1	15 10	25,000 P.T. Y.	Sydney	Sydney	1918	1922		3	—	7 6-in., 2 4-in. A.A., 8 L., 2 M.	(Q.)	25.5 450

DESTROYERS.—Quickmatch, Quiberon, Queenborough, Quality, Quadrant (ex-R.N. Quilliam Class); Arunta, Bataan, Warramunga (built at Cockatoo Docks to R.N. Tribal design); Stuart. Two Battle Class building in Australia.

STOOPS.—Warrego (1940), Swan (1936), 1,060 tons, 16½ knots, 3 4-in., 1 M.M., Moresby (1918), 1,650 tons, 1 12-pr.

FRIGATES.—River Class, Barcoo, Gascoyne, Burdekin, Hawkesbury (1943), 1,445 tons, 20 knots, 2 4-in.; Diamantina, Lachlan, Barwon (1944), Murchison, Maquarie (1945), 1,440 tons, 20 knots, 2 4-in.; Shoalhaven, Condamine (1946), 1,544 tons, 20 knots, 4 4-in., 40 M.M.

MINESWEEPERS.—Bathurst Class: Ararat, Ballarat, Bathurst, Benalla, Bendigo, Bowen, Bunbury, Bundaberg, †Burnie, †Cairns, Castlemaine, Cessnock, Colac, Cootamundra, Cowra, Deloraine, Dubbo, Echuc, Fremantle, Geelding, Gladstone, Glenelg, Goulburn, Gympie, Horsham, Inverell, †Ipswich, †June, †Kalgoorlie, Kapunda, Katoomba, Kiama, Laarobe, †Lismore, Lithgow, Maryborough, Mildura, Parkes, Rockhampton, Shepparton, Stawell, Strahan, †Tanworth, †Towomboba, Townsville, Wagga, Warrambool, Whyalla, †Woolongong (1940-43), 650-700 tons, 16 knots, 1 4-in., 2 or 3 Oerlikon.

MOTOR LAUNCHES.—Fairmile Type, 36 in number. 5 others.

BOAT DEFENCE VESSELS.—Koala and Kangaroo (1940), 770 tons, 11 knots, 1 12-pr.; Kookaburra (1939), 577 tons, 9½ knots, 1 12-pr., Karangi-Depot Ship.—Penguin (1917), 3,455 tons, 14 knots, 1 4-in.

MINELAYER.—Bungaree (1937), 3,155 tons gross, 11 knots, 2 4-in., 1 12-pr.

TUGS.—Tandred Sprightly (1942), 570 tons, 1 3-in.; Reserve (1942), 750 tons, 1 3-in.

† Serving with Royal Netherlands Navy.

ROYAL CANADIAN NAVY.
AIRCRAFT CARRIERS AND CRUISERS.

Class	NAME	Stand- ard dis- place- ment	Length (ex- treme)	Beam (ex- treme)	Draught	Horse- power. Type of machinery and boilers	Where built	Maker of engines	Date of launch	Date of com- ple- tion	Cost		Armour		Armament		Com- ple- ment
											£		Belt	Gun posi- tion	Guns	Tor- pedo Speed tubes	
Majestic Class L.A.C.	Magnificent	14,000	ft.	ft. in.	ft. in.		Harland & Wolff	Harland & Wolff					in.	in.			
Colossus Class L.A.C.	Warrior	14,000	695	80 0	23 0	40,000 P.T. (G.)	"	"	1944	1946					6 m.p.p.; many others.		25
Uganda Class Cr.	Uganda	8000	555½	62 0	16 6	72,000 P.T. (G.)	Vickers (Walker)	Parsons	1941	1943					9 6-in., 8 4-in. A.A., 16 smaller.	6 21" (T)	32
Swiftsure Class Cr.	Ontario	"	"	63 0	"	"	Harland & Wolff	Harland & Wolff	1943	1945					9 6-in., 10 4-in. A.A.	"	"

DESTROYERS.—Crescent, Croziers, Crystal (*ex-R.N. Crescent Class*); Sioux, Algonquin (*ex-R.N. Valentine Class*); Haida, Huron, Iroquois, Micmac, Nootka (Tribal design) (1941-46), 6 4-7-in., 2 4-in., 36-5 knots; Qu'Appelle (*ex-R.N. Fearless Class*); Gatineau (*ex-R.N. Eclipse Class*); Cayuga and Athabasca (Tribal Class) building.

FRIGATES.—River Class (1942-44), 1,445 tons, 2 4-in. A.A., 20 knots; Antigonish, Beconhill, Capilano, Grou, Hulloise, Levis, Kirkland Lake, Montreal, New Waterford, Orkney, Port Colborne, Royal Mount, St. John, St. Stephen, Springhill, Swansea, Wentworth.

CORVETTES.—Flower Class (1941-43), 950 tons, 16½ knots, 1 4-in.; Sackville, Woodstock.

MINESWEEPERS.—*Algerine Class* (1943), 850 tons, 1 4-in., 4 Oerlikons; Border Cities, Fort Frances, Kapuskasing, Middlesex, New Liskeard, Oshawa, Portage, Rockcliffe, St. Boniface, Sault, Ste. Marie, Wallaceburg, Winnipeg.

Motor Minesweepers (1944), 120 feet, 10 knots; Llewellyn, Lloyd George, Revelstoke.

Sweeping Mine Trawlers.—Comox, Nandose, Gaspe and Fundy (1938), 668 tons, 12½ knots, 1 4-in.

Armed Yachts.—Beaver, Caribou, Cougar, Elk, Grizzly, Husky, Moose, Reindeer, Renard, Saus Peur, Vision, Wolf.

ICEBREAKERS.—Ernest Lapointe (1941), 1,179 tons gross, 14 knots; Lady Grey (1906), 1,080 tons, 14 knots; M.B. McLean (1930), 5,000 tons, 15 knots.

TUGS.—Ocean Eagle (1919), 420 tons gross, 11½ knots.

OLIVERS.—Dundalk, Dundurn, Moonbeam, Sunbeam.

STORE CARRIERS.—Preserver, Provider, Laymore, Eastmore.

ROYAL INDIAN NAVY.

SLOOPs.—Wren Class (1943), 1,400 tons, 19½ knots, 6 4-in.: Cauvery, Godavari, Jumna, Kistma, Narbada, Sutlej; Hindustan (1930), 1,190 tons, 2,000 H.P., 16½ knots, 2 4-in., 4 3-pr., 10 smaller guns.

FRIGATES (1943), River Class, 1,445 tons, 20 knots, 2 4-in. A.A.: Shamsher, Tir, Dhanush, Kukri, Neza.

CORVETTES.—(Flower Class) 925 tons, 17 knots, 1 4-in. A.A., Assam, Malratia.

MINESWEEPERS.—Bangor Class (1941–42), 672 tons, 16 knots, 1 4-in. A.A., 1 Oerlikon; Baluchistan, Bihar, Carnatic, Decan, Kathiawar, Khyber, Konkan, Kumaon, Malwa, Orissa, Oudh, Rajputana, Rohikhand. A number of Motor Minesweepers. Bathurst Class, 650–700 tons, 16 knots, 1 4-in.: Bengal, Bombay, Madras, Punjab.

TRAWLERS.—(1941–42) Agra, Ahmedabad, Amritsar, Baroda, Berar, Bihar, Calcutta, Cochin, Cuttack, Karachi, Lahore, Madura, Nagpur, Nasik, Patna, Poona, Shillong, Travancore.

MOTOR TORPEDO BOATS.—About 20 in number.

MOTOR LAUNCHES.—A number of the Fairmile “B” type.

ROYAL NEW ZEALAND NAVY.

CRUISERS.

Class	NAME	Stand- ard dis- place- ment	Length (ex- treme)	Beam (ex- treme)	Draught	Horse- power. Type of machinery and boilers	Where built	Maker of engines	Date of launch	Date of com- ple- tion	Cost	Armour		Com- ple- ment (war)
												Belt Deck	Gun posi- tion	
Dido Class	Bellona	tons 5450	ft. 506	ft. in. 50 5	ft. in. 14 0	62,000 P.T. (G.)	Fairfields	Fairfields	1942	1943	£	in.	in.	knots 33
	Black Prince	”	”	”	”	”	Harland & Wolff	Harland & Wolff	1942	1943				6 21’ (T)

MOTOR LAUNCHES.—Fairmile Type, 12 in No., 16 others.

CORVETTES.—Arbutus Arabis (Flower Class).

TRAWLERS.—Castle Class (1943), 10 in No.; Isles Class (1941), 6 in No.

SOUTH AFRICAN NAVAL FORCES.

FRIGATES.—Good Hope, Natal, Transvaal (Loch Class).

A number of M.T.B's., Minesweepers, Coastal Craft and Auxiliaries.

ARGENTINE REPUBLIC.

Class	NAME	Standard Displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery	Where built	Date of launch	Date of completion	Cost	Armour					Armament		Speed	Fuel Oil	Com- ple- ment
											Belt	Deck above belt	Side belt	Bulk- head	Guns position	Guns	Torpedo tubes			
b.	Moreno	tons 27,940	ft. 585	ft. 97½	ft. 28	45,000* C.T. (G.)	Camden, N.J. (N.Y.S.B. Co.)	1911 1915	2,200,000	£ 2,200,000	in. 12-10 K.S.	in. 9-6 K.S.	in. 9-6 K.S.	in. 12-9 K.S.	in. 6 K.S.	12 12-in., 12 6-in., 4 3-in. A.A., 4 1-85-in., 6 M.	2 (sub.) 21*	knots 22-5 4200 1175	tons 22-5 4200 1175	
b.	Rivadavia	"	"	"	"	B. & W. 54,000 P.T. (G.)	Quincy, Mass. Vickers, Barrow	" 1914 1937 1938	" 1,750,000 approx.	" 1,750,000 approx.	"	"	"	"	"	9 6-in., 4 4-in. A.A., 2 3-in., 25 A.A. M.G., 1 catapult, 2 aircraft.	6 21*	30 1000 556 +60 Ctds.	"	"
cr.	La Argentina	6500	535	56½	16	100,000 P.T. (G.) Y.	Genoa	1929 1931	1,250,000	3 1	3 1		2	2		6 7-5-in., 12 4-in. A.A., 6 Pom Poms, 1 catapult, 2 sea- planes.	2 21*	32 1800 600	32 1800 600	
cr.	Almirante Brown	6495	545½	58	16½	13,000 R. Y. Y.	Leghorn	" "	" "	" "	"						"	"	"	"
cr.	Veinticinco de Mayo	6100	328	59½	24	13,000 R. Y. Y.	Leghorn	1897 1899	696,700	6-3 1½	6-3 1½	6 6	6 6	6 6	6 6	2 10-in., 8 4-7-in., 4 6-pr., 2 37-mm.	—	20 1000 515	20 1000 515	"
c.d.s.	General Belgrano†	6100	328	59½	24	13,000 R. Y. Y.	Sestri Ponente	1898 1901	782,000	6-3 1½	6-3 1½	6 5	6 5	6 6	6 6	2 10-in., 8 6-in., 4 6-pr., 1 37-mm.	—	20 1000 430	20 1000 430	"
c.d.s.	Pueyrredon †	6100	328	59½	24	13,000 R. Y. Y.											—	20 1000 430	20 1000 430	"

* Moreno and Rivadavia were converted to oil burning and fitted with geared turbines in 1928. † Converted to oil burning and armament altered in 1929. Used as training ships.

COAST DEFENCE SHIPS.—Libertad and Independencia, 2,510 tons, 13 knots, completed at Birkenhead in 1891-93, and converted to oil fuel in 1927, carry 2 9-4-in., 4 4-7-in., 4 3-pr. guns, 2 1-5-in. A.A.

RIVER GUERRILLA.—Panama and Rosario (Elswick, 1906), 1,055 tons, 2 6-in. howitzers, 6 3-in., 2 L., 15 knots.

TRAINING SHIP (cruiser).—Presidente Sarmiento (Birkenhead, 1896), 2,320 tons, 13 knots, 3 4-7-in., 1 4-in., 2 3-pr., 3 torpedo tubes.

SURVEYING VESSELS.—Madryn, Comodoro Rivadavia, ex-San Juan, Bahia Blanca ex-San Luis (Hawthorn Leslie, Newcastle, 1928), 970 tons, 1 3-in., 12 knots, Alférez Mackinlay (1914), 783 tons, 10 knots.

Tugs.—Mataco, Toba (completed 1928, at Messrs. Hawthorn Leslie's, Newcastle), 4,000 B.H.P., 16 knots, 4-1-in. guns.

MINESWEEPERS.—Comodoro Py, Bouchard, Drummond, Granville, Parker, Robinson, Seaver, Fournier, and Spiro (1937-38); 450 tons, 2,000 H.P., 16 knots, 2 3-9-in., 2 2-9-in. guns; Bathurst, Golondrina, Pinedo, Segui, Thorne (ex-German, 1917), 500 tons, 17 knots, 3 3-in. guns.

OTHERS.—Punta Alta (1937), 500 tons D.W.; Ministro Escorza (1914), 10½ knots; Ministro Frere (1927), and Floritino Aneghino; General Mosconi (building).

TRANSPORTS.—Chaco, Pampa (ex-Rio Claro) (1923), 2,100 tons, 11 knots; Ministro Frere (1925), 9½ knots; Patagonia (1925), 9½ knots; P. de Mayo; Ushuala, 1,250 tons, 12 knots; V. Fidel Lopez, 725 tons, 9 knots.

Argentine Republic.

Name or number	Where built	Launched	Dimensions			Number of screws	Displacement	Horse-power	Speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
DESTROYERS—													
Cervantes (<i>ex-Spanish</i>)	Cartagena	1925	318	31½	10½	2	Tons 1522	42,000	36	5 4-7-in., 1 3-in. A.A., 4 M.	2 triple 21-in.	160	Tons 540
Churrucá													
Juan de Garay (<i>ex-Spanish</i>)	Alcala Gallano												
Mendoza	J. S. White	1928	325	31-8	12½	2	1570	45,000	36	5 4-7-in., 1 3-in. A.A., 2 2-pr., 4 M.	2 triple 21-in.	160	700
La Rioja		1929	"	"	"	"	"	"	(La Rioja 39-4 ft.)				
Tucuman		1928	"	"	"	"	"	"					
Catamarca	Schichau	1911	288-7	27½	10	2	972	28,000	32	3 4-in., 2 1-pr.	4 21-in.	100	220
Jujuy	Germania	"	"	"	"	"	"	"					
Cordoba	Schichau	1910	295½	29-5	10	2	1000	28,000	34-7 ft.			100	200
La Plata	Germania	1911	"	"	"	"	"	"					
San Juan	J. Brown	1937	323	33	8½	2	1350	34,000	35½	4 4-7-in., 8 smaller	8 21-in. (Q)	170	450
San Luis	"	"	"	"	"	"	"	"					
Misiones	Caminnell	"	"	"	"	"	"	"					
Santa Cruz	"	"	"	"	"	"	"	"					
Buenos Aires	Vickers, Laird	"	"	"	"	"	"	"					
Entre Rios	Barrow	"	"	"	"	"	"	"					
SUBMARINES—													
Santa Fe	Taranto	1931	226½	21½	13	2	850	3000	17-5	1 4-in., 1 2-pr. A.A.	8 21-in.	41	—
Salta	"	1932	"	"	"	"	1080	1300	9				
Santiago del Estero	"	1933	"	"	"	"	"	"					

In January 1947 Argentina authorised the acquisition of an aircraft carrier, a cruiser, four destroyers, three submarines, ten patrol vessels and a transport.

BRAZIL.

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery	Where built	Date of launch	Date of completion	Cost	Armour					Armament		Speed	Oil	Com- ple- ment
											Belt	Deck	Side above Bulk- heads	Gun position		Guns	Torpedo tubes			
														Heavy guns	Secondary					
b.	Minas Gerais *	19,200 tons	ft. 541	ft. 83	ft. 25	25,000 R. T.	Elswick	1908/1910	£ 1,821,400	in. 9-8-4 K.S.	in. 2	in. 9-6-4 K.S.	in. 9	in. 12-8 K.S.	12 12-in., 12 4-7-in., 4 3-in. A.A.; 2 8-pr., 4 1-8-in. M., 8 A.A. M.G.	—	knots 21	— tons	1000	
b	São Paulo *	"	"	"	"	"	Barrow	1909/1910	"	"	"	"	"	"	10 4-7-in., 4 3-in., 3-pr.	4 21" (D)	"	800	"	
l.c.	Rio Grande do Sul†	3150 tons	401½ ft.	39 ft.	13½ ft.	22,000 R.C.T. (G.) T.	Elswick	1909/1910	"	1½ in.							27 knots	600 tons	450	

* Reconstructed and converted to oil fuel, 1934-39, 1937-40 respectively.

† Reconstructed, including conversion to oil fuel, at Rio de Janeiro, 1928.

MIXELAYERS.—Cananeia, Cabedelo, Camocim, Caravelas, Carioca, 188½ feet, 552 tons, 2,500 H.P., 14 knots, 1 4-1-in. gun, 50 mines; Itapicissim, 118 feet, 340 tons, 2 3-in., 30 mines; Itacurua (1901), 210 tons, 10 knots, 1 1-5-in.

MINESWEEPERS.—Iguape, Itajai (1908), 150 tons, 10 knots, 1-85-in.; Itaparica (1894), 221 tons.

RIVER MONITORS.—Pernambuco, 470 tons, 11 knots, built at Rio de Janeiro (1910), 2 4-7-in., 2 3-pr. guns; Paranaíba, 600 tons, 180½ feet in length, 12 knots, 1 6-in. gun, 2 3-4-in.; Paraguassu, 430 tons, 146 feet, 1 4-7-in. gun, 13 knots; Oiapoque (1907), 195 tons, 14 knots, 2 3-pr., 2 M.

SUBMARINE TENDER.—Ceará (Spezia, 1916), 4,000 tons, 4,100 H.P., 14 knots, 2 4-in., 4 3-pr.

REPAIR SHIP.—Belmonte (ex-German SS, Valesia), 5,227 tons gross, 4 4-7-in., 6 6-pr., 2,700 H.P., 12 knots.

TRAINING SHIP.—Almirante Saldanha, Vickers, (1934). A four-masted schooner, 3,325 tons, 305 feet over all, 4 4-in. and 1 3-in. A.A. guns, 1 21-in. torpedo tube, 1,400 B.H.P. aux., 12 knots.

SURVEY VESSELS.—Rio Branco, 895 tons, 15 knots, 2 6-pr.; Jose Bonifacio, 1,300 tons, 9 knots, 2 4-in., 2 6-pr. Jacequay, 800 tons, 16 knots.

SUBMARINE CHASERS.—Guaiaba, Guaporé, Gurupi and others (ex-U.S.) (1942-43), 335 tons, 25 knots; Javari, Jutai, Jurua, Juruena, Jaguarao, Jaguaribe, Jacui, Jundiá (1942), 100 tons, 15 knots, 1 3-in.; Rio Negro (1943), 137 tons, 14 knots.

TANKERS.—Novais de Abreu (1918), 10 knots, 500 tons; Marajo (ex-Malistan, 1924), 5,553 tons gross, 10 knots; Potengi (1938), 800 tons, 10 knots.

OCEAN-GOING TUGS.—Laurindo Pitta (1910), 514 tons, 850 H.P., 11 knots; Annibal Mendonça (1919), 1,200 H.P., 12 knots, 2 3-pr.; Heitor Perdigao, Muniz Freire, Lomba (1924), 200 tons, 850 H.P., 11 knots, 2 3-pr.

LIGHTSHIP TENDERS.—Lahnmeier, Mario Alves, 280 tons.

TRAWLERS.—Barreto Menezes, Filipe Camarao, Fernandes Vieira, Henrique Dias, Matias de Albuquerque, Vidal de Negreiros (1941), 12½ knots.

Brazil.

Name or number	Where built	Launched.	Dimensions			Number of screws	Displacement	Horse-power	Speed	Armament	Torpedo tubes	Complement	Fuel	
			Length (extreme)	Beam	Draught								Coal	Oil
DESTROYERS—														
Amazonas	Rio de Janeiro	Bldg.	323	33		2	1380	43,000	36.5	5 5-in., 6 M.	12	190	Tons	
Araguaia	"		"	"		"	"	(G.)	"	A.A.	21-in. (Q.)	"	500	
Acre	"		"	"		"	"	"	"	"	"	"	"	"
Ajuricaba	"		"	"	"	"	"	"	"	"	"	"	"	"
Apa	"		"	"	"	"	"	"	"	"	"	"	"	"
Araguari	"		"	"	"	"	"	"	"	"	"	"	"	"
Greenhalgh	"	1941	360	34½	9½	2	1500	50,000	36	5 5-in.	12 21-in. (Q.)	"	"	"
Marcello Dias	"	1940	"	"	"	"	"	"	"	"	"	"	"	"
Maris E. Borros	"	"	"	"	"	"	"	"	"	"	"	"	"	"
Marauhao (ex-Porto)	Thornycroft	1913	265.3	26.5	10	2	934	22,500	31	3 4-in., 1 2-pr.	4 21-in. (D.)	100	—	250
Eight destroyer escorts are on loan from U.S.														
SUBMARINES—														
Humaita	Spezia (Ansaldo Fiat)	1927	282	25.6	14	2	1450 1884	4800 2200	18.5 10	1 4.7-in. A.A. ; 4 M., 20 mines	6 21-in.	55	—	140
Tamoia	Spezia (Orlando)	1936	195½	21	14½	2	620 855	1350 800	14 8	1 3.9-in., 2 M. A.A.	6 21-in.	33	..	
Tymbira														
Tupi		1937												

CHILE.

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery	Where built	Date of launch	Date of completion	Cost	Armour					Armament		Speed	Fuel		Com- ple- ment
											Belt	Deck	Side above Belt	Bulk- head	Gun position	Heavy guns	Secondary		Guns	Torpedo tubes		Coal	Oil
b.	Almirante Latorre * (ex-H.M.S. Canada)	tons 28,950	ft. 661	ft. in. 92 6	ft. in. 29 0	37,000 P.T. Y.	Elswick	1913 1915		£	in. 9-4	in. 4-2½	in. 4½	in. 10	in. 6			10 14-in., 14 6-in., 4 4-in. A.A., 4 7-8- in., 1 catapult.			4 (sub.) 21			knots 23	tons — 4300	1000
cr.	Chacabuco	3417	360	46 6	17 0	15,500	Elswick	1898 1891								6 6-in., several small- er.	2 18"	17		400	

* Fitted with bulges, converted to oil burning, and modernised in England (completed 1931).

FRIGATES.—(River Class, *ex-R.C.N.*) Uquique, Esmeralda, Covadonga (1884-44), 1,445 tons, 20 knots, 4-in. guns.CORVETTES.—(Flower Class, *ex-R.C.N.*) Casma, Chipana, Papuda (1944), 1,000 tons, 16 knots.LANDING CRAFT.—(*Ex-U.S.N.*) 14 in number.

OILERS (Armstrongs, 1930).—Maipo, Rancagua, 3,080 tons displacement, 2 4-7-in. guns.

SUBMARINE DEPOT SHIP.—Araucano (Vickers-Armstrongs, Barrow), completed 1936, displacement 5,890 tons, armament 2 4-7-in., 2 3-in. A.A., speed 13 knots, H.P. 2,500, 1 seaplane.

SURVEYING VESSEL.—Vidal Gormaz (*ex-Jason*), 700 tons, 13 knots.

TRANSPORT.—Angamos, 3,800 tons, 12 knots; Abtao (1912), 691 tons, 10 knots; Magallanes, 9,000 tons.

COASTGUARD VESSELS.—Aguila (1941), 1,026 tons, 12 knots; Micalvi (1925), 850 tons, 9½ knots; Orompello (1919), 530 tons, 14½ knots, 2 3-in. guns; Yelcho (1906), 487 tons, 12 knots;

Condor (1889), 145 tons, 9 knots; Piloto Sibbald (1916), 1,100 tons, 11½ knots; Porvenir (1906), 450 tons, 8 knots.

Tugs.—Jancqueo, Galvarino, Colocolo, Sobenes, Cabraes (1930), 790 tons, 11 knots; Contramaestre Britto, Pelantaro (1897), 320 tons, 12 knots; Atlas (1907), 348 gross tons; Anend (1906), 104 gross tons.

Chile.

Name or number	Where built	Launched	Dimensions			Number of screws	Displacement	Horse-power	Speed	Armament	Torpedo tubes	Complement	Fuel
			Length (extreme)	Beam	Draught								Coal Oil
DESTROYERS—			Feet	Feet	Feet		Tons		Knots				Tons
Serrano	Thornycroft's	1928	300	29	9	2	1090	28,000	30	3 4·7-in., 1 3-in. 3 20-mm.	6 21-in. (r)	130	340
Orella	"	"											
Riquelme	"	"											
Hyatt	"	"											
Videla	"	"											
Aldea	"	"											
SUBMARINES—													
Capitan Thompson	Vickers Arm- strong's	1929	275	27·5	14·8	2	1520	3000	15	1 4-in.	8	54	—
Almirante Simpson	(Barrow)	1928					1990	1300	9		21-in.		200
Capitan O'Brien													
H 1. Gualcolda	Fore River, -U.S.A.	1915	150·3	15·75	12·3	2	355	480	13		4	22	—
H 4. Guale							470	640	11		18-in.		17·5
H 5. Quidora													
H 6. Fresia													

DENMARK.

Name or number	Where built	Launched	Dimensions			Number of screws	Displacement	Horse-power	Speed	Armament	Torpedo tubes	Complement	Fuel Coal Oil
			Length (extreme)	Beam	Draught								
FRIGATES			Feet	Feet	Feet		Tons		Knots				Tons
Niels Fbbsen (<i>ex</i> -H.M.S. Annan)	Hall Russell	1944	303	36.5	12	2	1370	5,500 (R.)	20	2 4-in. HA/LA, several smaller.	—		
Holser Danske (<i>ex</i> -H.M.S. Monnow)	Chas. Hill	"	"	"	"	"	"	"	"	"	"		
CORVETTE													
Thetis (<i>ex</i> -H.M.S. Gera- nium)	Wm. Simons	1940	205	33	13.5	1	1000	2,750 (R.)	16½	1 4-in., several smaller.	—		
TORPEDO BOATS													
Willmoes	Copenhagen	1942	279	27.4	8.0	2	710	21,000	35	2 4-in.	6	—	—
Huitfeld	"	"	"	27.4	8.0	2	"	"	35	4 1.5-in.	21 in.		
Kreiger	"	1946	210	"	"	"	329	"	"	"	"		
Krabbe	"	"	"	"	"	"	"	"	"	"	"		
(and four others)	"	Bldg.	"	"	"	"	"	"	"	"	"		
T4. Glenten	Royal	1934	198.9	19.5	7½	2	285	6,000	27½	2 3.4-in., 2.78 M., 2 M.	6	51	40
T5. Hogen	Dockyard,	1933	"	"	"	"	"	"	"	"	17.7-in.	"	26
T6. Ornen	Copenhagen	1930	"	"	"	"	"	"	"	"	17.7-in.	"	26
T1. Dragen	"	"	"	"	"	"	"	"	"	"	"	"	"
T2. Hvalen	"	"	"	"	"	"	"	"	"	"	"	"	"
R4. Havkatten *	"	1919	126.3	13.9	9	2	110	2,000	24.6 t.	2-6-pr. A.A.	2 (R2)	24	15
							320	600	15				
SUBMARINES—							420	220	8	2 1.5-in.	5		20
Havhesten. H4.		1939	155.6	15.3	9.4	2	"	"	"	"	18-in.	"	"
Havkalen. H3		1937	"	"	"	"	"	"	"	"	"	"	"
Havfruen. H2		"	"	"	"	"	"	"	"	"	"	"	"
Havmanden. H1		1936	"	"	"	"	"	"	"	"	"	"	"
U2 (<i>ex</i> -H.M.S.	Vickers	1943	190	16	13	2	540	615	11½	1 3-in., 3 smal- ler.	4 or 6	27	"
Vulpine	(Walker)						730	825	10		21-in.	"	"
U1 (<i>ex</i> -H.M.S. P.52)	Vickers	1942	"	"	"	"	"	"	"	"	"	"	"
U3 (<i>ex</i> -H.M.S. P.87)	"	1944	"	"	"	"	"	"	"	"	"	"	"

* Used as patrol vessel.

MINELAYERS.—Steamboat A, 96 tons, 7 knots, 2 M.G.; Lindormen (1941), 650 tons, 14 knots, 2 3-in., Laaland, Lougen, 250 tons, 11 knots.

MINESWEEPERS. Sohesten, Soridderen, Sohunden (1942), 300 tons, Sobjornen, Soulsen, 270 tons, 18 knots, 2 3-in. guns, Springerer, Halen, Narhvalen (1916), 110 tons, 24.3 knots, 2 2.5-in. guns, M.S.I.—M.S. 10, eight *ex*-R.N. M.M.S.'s.

SURVEYING VESSELS.—Hejmdal, 705 tons, 12½ knots, 2 3-in. guns, 4.71-in. A.A.; Ternen, 80 tons, 1 1.46-in.; Freja (1940), 315 tons, 10 knots.

FISHERY PROTECTION VESSELS.—Ingolf, 1,180 tons, 16½ knots, 2 4.7-in., 2 2½-in. guns, 1 aircraft; Hvidbjørnen, 1,060 tons, 14½ knots, 2 3½-in. guns; Islands Falk, 730 tons, 13 knots, 2 3-in., 2 1½-in. guns; Beskytteren, 415 tons, 11 knots, 1 2½-in. gun; Maagen, 110 tons, 8 knots, 1 1½-in. gun.

DEPOT SHIPS.—Hekla, Fven.

TRANSPORT SHIPS.—Sleipner, 110 tons, 8.7 knots; Middegründen, Fremad. 4 Icebreakers. 3 Cable Ships.

ROYAL YACHT.—Dannebrog (1932), 1,130 tons, 14 knots.

FRANCE.—BATTELSHIPS.

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery and boilers	Where built	Date of launch	Date of completion	Cost	Armour					Armament		Speed	Fuel		Com- ple- ment
											Belt	Deck	Side above Belt	Bulk- head	Gun position	Guns	Torpedo tubes		Coal	Oil	
b.	Richelieu	35,000 tons	ft. in. 794 0 108 6 W.L.	ft. in. 6 26 7	ft. in. 26 7	155,000 (G.) L.	Brest	1939 1940	£	in. 9-16	in. 9	in.	in.	in. 17	in. 5, 2	8 15-in., 9 6-in. A.A., 12 3-9-in. guns A.A., 67 40- mm. Bofors A.A., 39 Oerlikons 20- mm. A.A.	Nil	knots about 31	8000	1959	
b.	Jean Bart	"	"	"	"	"	St. Nazaire A. C. Loire and Penhoet	1939 1943		"	"							"	"	"	
b.	Lorraine	22,189 tons	ft. in. 544 6 88 6	ft. in. 32 0	ft. in. 32 0	42,000 B. P.T.	St. Nazaire— Penhoet	1913 1916	2,642,439	11-7 K.S.	24-1½	7 K.S.	7 K.S.	10½ K.S.	7 K.S.	8 13-4-in., 14-5-4-in., 8 3-9-in. A.A., 14 40-mm. A.A. (Bo- fors), 25 Oerlikons 20-mm. A.A.	Nil	21½	900 2800	1167	

Richelieu very completely refitted in U.S.A. (1942-44).
 Jean Bart towed uncompleted to Casablanca in June 1940 and remained there until January 1946. Will be completed on similar lines as Richelieu but with an increased armament.
 Lorraine reconstructed and modernised between 1934 and 1937. Employed as a gunnery school ship.

FRANCE.—AIRCRAFT CARRIERS.

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power	Where built	Date of launch	Date of completion	Armour		Armament		Speed	Fuel Oil	Complement
										Belt	Deck	Gun position	Guns			
L.A.C.	Arromanches (<i>ex</i> -H.M.S. Colossus) Béarn *	tons 14,000	ft. in. 695 0	ft. in. 80 0	ft. in. 23 0	40,000 P.T.(G.)	Vickers (Walker)	1943	1944	in.	in.		6 m.p.p.'s; a number of light A.A. guns 4 <i>5-in.</i> , A.A., 24/28 A.A., 26 Oerlikons 20 A.A.	knots 25	tons 2070	850
Aircraft Trans- port		22,146	599 0	115 6	30 6	37,200 Tur. & R.	La Seyne	1920	1928	3½ 1-3				21.5		850
Aircraft Trans- port	Commandant Teste ||	10,000	548 0	88 7	22 9	21,000 †	Bordeaux	1929	1932	2 1½			12 <i>3.9-in.</i> H.A./L.A. many lighter A.A.	20.5		648
E.C.	Dixmude (<i>ex</i> -H.M.S. Bitter)	14,000	492 0	69 6	28 6	8,500 Diesel	Brooklyn U.S.A.	1940	1942				— 4-in., 20 A.A.	16		

* Originally designed and laid down as a battleship; reconditioned 1935 and 1944/45.

† Schneider-Zoelly turbines (G.). Yarrow-Loire S.T. boilers.

|| Scuttled at Toulon, 27 November, 1942, but refloated; may be converted into an escort carrier.

FRANCE.—CRUISERS.

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery and boilers	Where built	Date of launch	Date of completion	Cost	Armour		Armament		Speed	Fuel Oil	Complement
											Belt	Deck	Guns	Torpedo tubes			
<i>Training cruiser</i>	Jeanne d'Arc	tons 6496	ft. 557 9	ft. 57 5	ft. 18 8	32,500	St. Nazaire Penhoet	1930	1931	£	in.	in.	8 6·7-in., 4 3-in. A.A., 14/40 A.A., 20/20 A.A.		knots 26	tons 1400	648
Improved La Galissonnière	De Grasse	8000	580 0	61 0	18 2	110,000	Lorient	Bldg.					9 6-in., 12 3·9-in. A.A., 28/40 A.A., 12/20 A.A.	6 21"	33·5	2050	
La Galissonnière	Gloire	7600	589 0	57 4	17 5	84,000 (G.)	Bordeaux	1935	1937		4½	Deck 1½	9 5·9-in., 8 3·5-in. A.A., 24/40 A.A., 16/20 A.A.	4 21·7" (D.)	31	1500	750
	Montcalm	"	"	"	"	"	La Seyne	1935	1937		"	"	"	"			
	Georges Leygues	"	"	"	"	"	St. Nazaire Penhoet	1936	1937		"	"	"	"			
Suffren Class	Suffren	10,000	643 0	65 0	24 0	90,000 Rat. (G.) G.	La Seyne	1927	1930	1,210,000			8 8-in., 8 3-in. A.A., 8 7·46-in. A.A., 18/20 A.A., 12/13 A.A.		32	2000	773
Duquesne Class	Tourville	10,000	626 8	62 4	23 0	120,000 Rat. (G.) G.	Lorient	1926	1928				8 8-in., 8 3-in. A.A., 8/40 A.A., 15/20 A.A.		33·5	2050	620
	Duquesne	"	"	"	"	"	Brest	1925	1928				"	"			
Duguay-Trouin Class	Duguay-Trouin	7249	594 10	57 6	20 8	110,000 P.T. (G.) G.	Brest	1923	1928	..	..	..	8 6·7-in., 4 3-in. A.A., 6/40 A.A., 20/20 A.A.		34	1480	662
M.Cr.	Émile Bertin	5886	580 9	52 0	16 4	102,000 P.T. (G.) Pen.	St. Nazaire	1933	1934	..	..	Deck 2	9 5·9-in., 8 3·5-in. A.A., 16/40 A.A., 20/20 A.A.		34·0	1850	700

*Light Cruisers	2500	434	6	39	6	14	0	74,000 T.(G.) (over 74,000 on trials)	Lorient La Seyne Caen Dunkirk A.C. France	1934 1933 1933 1934 1935	1935	5 5.4-in., 8/40 A.A., 10/20 A.A.	6 21.7	37	730	297
Le Fantasque Le Malin Le Terrible Le Triomphant																
Albatros	2441	423	0	40	0	14	0	64,000 T.G.	St. Nazaire	1930	1931	5.5-4-in.; 4.7-46-in. A.A.	6 21.7	38	650	220
Tigre	2426	418	0	37	6	17	6	55,000 T.(G.)	A.C. Loire Nantes A.C. Bretagne	1924	1926	4.5-7-in., 1/40 A.A.; 8/20 A.A.	3 21.7	35.5	540	255

* Now rated "light cruisers" under French classification. All reached between 43 and 45.25 on trials and still good for a continuous 37 knots under loaded trim.

LIGHT ESCORT VESSELS.—30 *ex-American* P.C. (6 Sabre, 9 L'Atentif, 15 Carabinier) 1942-43: 300 tons, 20 knots, 1 3-in., 1/40 A.A., 5/20 A.A., numerous depth charges.
SUBMARINE CHASERS.—69 *ex-American* S.C. (CH5, 6, 51, 52, 61, 62, 71, 72, 81/85, 91/96, 101/107, 111/115, 121/126, 131/136, 141/146), 1942-43, 110 tons, 15 knots, 1/40 A.A., 3/20 A.A., numerous depth charges; CH2, 3 (1933-34), 148 tons, 20 knots, 1 3-in., 1/40 A.A., 3/20 A.A. CH10/15 (1939), 102 tons, 16 knots, 1 3-in., N. 20 A.A.; CH41/43 (1939), 126 tons, 16 knots, 1 3-in., N. 20 A.A. V101/104 (Falmale, Canada), 1942, 82 tons, 19 knots, 1/47, 1/20 A.A. 28 *ex-H.D.M.L.* (England), 1941-42, 52 tons, 12 knots.

MOTOR TORPEDO BOATS.—M.T.B.90, 91, 92, 94, 98, 229 (1942-43), 45 tons, 40 knots, 1/20 A.A., 4 m.g., 2 torp. M.G.B.120/121 (1945), 65 tons, 40 knots, 12/15 A.A., 8 others bldg. 2 of which as M.T.B., M.G.B.130/131 (1945), 29 tons, 40 knots, 7/15 A.A.

MINESWEEPERS.—30 *ex-American* Y.M.S. (1942-43), 280 tons, 12 knots, 1/3-in. A.A., 2/20 A.A., 2 m.g. 22 *ex-British* M.M.S. (1942-43), 210 tons, 11 knots, 2 m.g. 849 tons.
PATROL VESSELS (*ex-Trawlers*).—Le Sétouise, l'Alajacienne, La Toulonnaise (1934-35), 738 tons, 10 knots, 1 3-in. gun; Admiral Mouchet (1936), 970 tons, 12 knots; Reine des Flots (1923), 849 tons.

SURVEYING VESSELS.—Gaston Rivier, Sentinelle, Laperouse.
OILERS.—La Drome (1920), 1,055 tons, 1,100 H.P., 10 knots; Le Mekong (1928), Elorn (1930), Var (1931), 5,482 tons, 6,000 H.P., 13 knots; La Charente, La Mayenne (1942-46), 4,289 tons, 5,200 H.P., 15 knots; La Seine, La Saone (bldg.), 19,900 tons, 14,750 H.P., 19 knots; GASOLINE TANKERS.—2 *ex-American* A.O.G., L.A.C. Noir, L.A.C. Favin, 3 *ex-American* Y.O.G., L.A.C. Chambon, L.A.C. Tchad, L.A.C. Tonlesap.

TRANSPORTS.—Quercy (1938), 4,750 tons, 4,000 H.P., 13 knots; Barleur (1938), 4,320 tons, 4,000 H.P., 15 knots; Cap des Palmes (1936), 4,160 tons, 4,500 H.P., 17 knots. All of them *ex-fruit* carriers, diesel driven with exceptional endurance, were armed as auxiliary cruisers during the war. Hamelin (1920), 622 tons, 1 3-in. gun; and 5 *ex-enemy* ships.

TRAINING SHIPS.—La Belle Poule, L'Étoile (1932), 227 tons, 120 H.P., auxiliary diesel, 6 knots; Paris (*ex-battleship*), 22,000 tons; Mutin; Ler Maitre le Goff; Giraudia II.

TARGET SHIP.—L'Impassible (1939), 2,410 tons, 10/13 knots.

FLEET TUGS.—Over 40, 600/1,200 tons, 10/13 knots.

NET LAYERS.—3 *ex-American* A.N., L'Aragnée (*ex-Hackberry*), Scorpion (*ex-Yew*), Tarantule (*ex-Pepperhead*), 700 tons.

SUBMARINE PATENT SHIP.—Jules Verne (1931), 5,147 tons, 7,000 H.P., 16 knots; Pollux (1916), an *ex-Russian* ice-breaker, 2,461 tons, 14 knots.

DEPOT SHIPS.—Alphée, Yamiok Joseph.

FISHERY PROTECTION VESSELS.—Quentin-Roosevelt (1918), 586 tons, 14 knots, 1 3-in. gun.

FRANCE.—FLOTILLAS.

Name or number	Where built	Launched	Dimensions			Number of screws	Displacement	Horse-power	Speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
FLOTILLA LEADERS—													
*Hoche (ex-Z.25)	Deschimag Brime	1942	Feet 404	Feet 38½	Feet 17	2	Tons 2400	70,000	Knots 37	4 5·9-in., 8/37 A.A., 12/20 A.A.	8 21-in.		Tons 820
*Marceau (ex-Z.31)	„	1942	404	38½	17	2	2400	70,000	37	2 5·9-in., 1 4-in. A.A., 14/33 A.A., 8/20 A.A.	8 21-in.		820
*Desaix (ex-Z.5)	„	1935	381	38	16	2	1625	70,000	37	5·5 in., 8/37 A.A., 8/20 A.A.	8		700
*Kléber (ex-Z.6)	„	1935	381	38	16	2	1625	70,000	37		8 21 in.		700
DESTROYERS—													
Forbin	Havre	1928	351·7	32·2	10·2	2	1378	31,000 T(G)	30	3 5·1-in., 1/40 A.A., 8/20 A.A.	7 21·7-in. (T.)	165	370
Basque	Maritime	1929											
L'Alcyon	Bordeaux	1926											
Le Fortuné	Caen	1926											
Ouragan	Caen	1924	347	33·0	13·9	2	1319	33,000 T(G)	30	3 5·1-in., 1/40 A.A., 8/20 A.A.	7 21·7-in. (T.)	165	370
Simoun	St. Nazaire	1924											
Tempête	Nantes—Caen	1925											
Trombe	Bordeaux	1925											
Mistral	Le Havre	1925											
*Alsacien (ex-T23)	Deschimag	1942	319	31	10	2	1200	31,000	31	4 4-in. A.A., 4/37 A.A., 12/20 M.	2 21·7-in. (T.)		290
*Lorrain (ex-T28)	„	1942								6 5·1-in., 6/40 A.A., 6/20 A.A.	2 21·7-in. (T.)		480
L'Aventurier	Bordeaux	Bldg. (work stop-ped)	363½	36½	10½	2	1772	56,000	37		2 21·7-in. (T)		
TORPEDO BOATS—													
*Bir Hakeim (ex-T6)	Schichau	1939	286	28½	7	2	840	22,000	33	1 4·1-in. A.A., 3/37 A.A., 12/20 A.A.	1 21-in. (T.)		200
*Baccarat (ex-T11)	„	1939	278	29	7	2	850	22,000	33	2 3·9-in., N/20 A.A.	1	131	90
La Melpomene	Nantes	1935	264½	25½	9·2	2	610	22,000	34·5		21·7-in. (D.)		
La Flore	Le Trait	1935											
La Cordelière	Le Havre	1936											
L'Incomprise	Le Trait	1936											
Bouclier	„	1937											
FRIGATES AND D.E.													
Sénégalais	U.S.A.	1943	305	31	12	2	1300	6,000	20	3 3-in. A.A., 2/40 A.A., 12/20 A.A., 8 mortars, 2 rails for a/s d.ch.		150	340
Algerien	„	1943						Dies. elect.					
Tunisien	„	1943											
Marocain	„	1944											
Hova	„	1944											
Somali	„	1944											
L'Aventure (ex-Braid)	England	1943	301½	36½	12	2	1445	5,500 Rec.	19·5	2 4-in., 12/20 A.A., 4 mortars, 2 rails for a/s d.ch.			645
Le Decouverte (ex-Windrush)	Wm. Simons												
L'Escarmouche (ex-Frome)	Henry Robb	1943											
La Surprise (ex-Torrige)	Blyth Dry Docks	1943											
Croix de Lorraine (ex-Strule)	„	1943											
Tonkinois (ex-Moyola)	Henry Robb	1944											
	Smith's Dock	1944											

* ex-German leaders transferred in 2.46.

France—continued.

Name or number	Where built	Launched.	Dimensions			Number of screws	Displacement	Horse-power	Speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
CORVETTES—													
Cdr. d'Estienne D'Orves (<i>ex-Lotus</i>)	England Chas. Hill	1941/ 42	205	33	13½		Tons 1000	2,800 Rec.	Knots 16	1 4-in., 1 6- pdr., 1/40 A.A., 2/20 A.A., 22 depth ch.		79	Tons 230
Cdr. Detroyat (<i>ex-Coriander</i>)	Hall & Russell	"											
Cdr. Drogou (<i>ex- Chrysanthemum</i>)	Harland & W.	"											
Roselys (<i>ex-Sundew</i>)	John Lewis	"											
Aconit (<i>ex-Aconite</i>)	Ailsa S.B. Co.	"											
Lobelia (<i>ex-Lobelia</i>)	A. Hall	"											
Renoncule (<i>ex-Renonculus</i>)	Wm. Simons	"											
COLONIAL SLOOPS—													
Dumont Durville	Bordeaux	1931	341	42	16		1969	3,200 (D.)	15.5	3 5.4-in., 4/40 A.A., 11/20 A.A.		176	270
Savorgnan de Brazza	"	1931											
D'Entrecasteaux	Pt. de Bouc	1931											
La Grandiere	"	1939											
SLOOPS (for Colonial Surveying Service)													
Sans Peur	St. Nazaire	1942	312	45	11		1350 f.l.	2,300 (D.)	18	2 4-1-in.			
Sans Souci	"	1942											
ESCORT VESSELS (fit- ted as fleet mine- sweepers)—													
Elan	Lorient	1938	256	28	8		630	4,000 (D.)	20	2 3.9-in. A.A., 2/40 A.A., 4/ 20 A.A., depth ch.		100	100
Cdt. Bory	Dunkirk	1939											
Cdt. Delage	"	1939											
Cdt. Duboc	Nantes	1939											
La Capricieuse	"	1939											
La Moqueuse	"	1940											
Cdt. Domine	"	1939											
La Bondeuse	Dunkirk	1939											
La Gracieuse	Pt. de Bouc	1939											
Cdt. Bisson	Lorient	1946	254	28	10		641	4,000 (D.)	20	1 4.1-in., 4 20-mm.		100	100
Cdt. Ducuing	Nantes	1946											
Cdt. Amyot Dinville	"	Bldg.											
Cdt. de Pimdan	Nantes	Bldg.											
Chevreuil	Lorient	1939	256	28	10		647	4,000 (D.)	20	2 3.5-in. or 3.9-in., 1/40 A.A., 6/20 A.A. or 8/20 A.A.			
Gazelle	"	1939											
Annamite	"	1939											
1ST CLASS SUBMARINES													
Archimède	Caen	1930	302.5	27	16		1379 2060	6,000/ 2,000	17/10	1 3.9-in., 2/20 A.A., 10 T. 21.7-in.		83	290
Argo	Nantes	1929											
Le Glorieux	Cherbourg	1931	302.8					6,500/ 2,000	18/10				
Le Centaure	St. Nazaire	1932						8,000/ 2,000	19/10				
Casabianca	"	1935	302.8										
2ND CLASS SUB- MARINES—													
La Créole	Le Havre	1946	238	22	13½		893 1180	3,000 1,400	17/10	1 3.9-in. A.A., 10 T. 21.7-in.		64	101
L'Artennse	Bldg.												
L'Africaine	Bldg.												
L'Astrée	Bldg.												
L'Andromède	Bldg.												
L'Antigone	Chalons (Schneider)	Bldg.											
Curie (<i>ex-P67</i>)	Vickers	1943	200	16	14½		626 721	800 760	13/9	1 3-in. A.A., 3 M.G., 4 T. 21-in.		37	56
Doris (<i>ex-Vineyard</i>)	"	1944	205	16½	14½		648						
Morse (<i>ex-Vortex</i>)	"	1944					732						
Narval (<i>ex-Bronzo</i>)	Tarento	1942	197½	21	16½		714 864	1,600 800	16/8	1 3.9-in., 2/20 A.A., 6 T. 21-in.			
Several <i>ex-German</i> U-boats													

France—continued.

Number and name	Where built	Launched	Dimensions			Number of screws	Displacement Surf./Sub.	Horse- power	Speed Surf. Sub.	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
2ND CLASS SUR- MARINES—			Feet	Feet	Feet		Tons		Knots				Tons
Junon	Havre	1935	224	17½	13	2	597	1300	14	1 3-in., 2 M.	9	43	..
Iris	Dubigeon	1934					800	1230	9		21·7-in.		
La Vestale	Schneider	1932	210	20	13	2	558— 570	1300	14	1 3-in. A.A.	6	43	..
La Sultane	Schneider						787	1000	9		21·7-in.		
Antiope	Havre	1932	216½	20	13	2	568— 571	1300	14	1 3-in. A.A.	6	43	..
Amazone	Le Trait	1932					787	1000	9·2		21·7-in.		
Aréthuse	Schneider	1929									15·7-in.		
MINELAYING SUB- MARINE—													
Rubis	Toulon	1930	216·5	23·8	13·5	2	669 910	1300 800— 1000	12 9	1 3-in., 1 M., 32 mines.	5 21·7-in.	40	..

French submarines are divided into two classes. 1st class: All vessels of 900 tons and above in the surface condition.
2nd class: All smaller vessels, including the minelayers.

GREECE.

NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery and boilers	Where built	Date of launch	Date of completion	Cost	Armour					Armament		Speed	Coal Oil	Com- ple- ment	
										Belt	Deck above Belt	Side above Belt	Bulk- head	Gun position	Guns	Heavy guns				Secondary
Georgios Averoff *	tons 9301	ft. 462	ft. 69	ft. 24½	19,000 (21,000) B.	Leghorn (Orlando)	1910/1911		£ 1,100,000	in. 8-3½ K.S.	in. 1½	in. 7	in. 7	in. 8-6½	in. 7	4 9-2-in., 8 7-5-in., 16 3-in., 4 3-pr., 2 3-in. A.A., 2 M.	3 (sub.) 18-in.	knots 22½ (24½) †	tons 22½ 1500 —	620

* Refitted 1932.

† Probable speed 15 knots.

TRAINING SHIPS.—Graz (1929), 1,870 tons, 11 knots, 4 3-in. guns. Ionia.

REPAIR SHIP.—Hephestios (1920), 4,549 tons gross, 11½ knots, 4 4-in. A.A.

M.T.B.'s, T1 and T2, Thornycroft type, 55 ft., 37 knots, 2 Lewis guns, 2 T.T., 4 built at Venice, for Customs Service.

SALVAGE VESSEL.—Tenedos, 450 tons, 13 knots.

LANDING SHIP TANKS.—Chios, Lemnos, Lesbos, Samos (ex-U.S. L.S.T.'s 33, 35, 36, 37).

MOTOR MINESWEEPERS.—Patmos, Calymnos, Letos, Salamina, Paralos, Karteria, Amphiroessa, and 7 others, ex-B.Y.M.S., 280 tons, 13-in.; also ex-R.N.M.M.S's.

MOTOR LAUNCHES.—17 in number (ex-British).

TRANSPORTS.—Patrai, Thessaloniki (ex-R.N.), 1941, 1,000 tons, 16½ knots.

SUBMARINE CHASER.—King George II (ex-U.S.P.C.), 280 tons, 22 knots, 13-in.

Greece.

Name or number	Where built	Launched	Dimensions			Number of screws	Displacement	Horse-power	Maximum trial speed	Armament	Torpedo tubes	Complement	Fuel	
			Length (extreme)	Beam	Draught								Coal	Oil
DESTROYERS—														
Adrias (<i>ex</i> -British Hunt Class)	Yarrow	1941-42	280	31½	8	2	1000	19,000	27½	4 4-in.	2 21-in.			Tons
Aegean "	Thornycroft	"	"	"	"	"	"	"	"	"	"			
Crete "	Swan Hunter	"	"	"	"	"	"	"	"	"	"			
Hastings "	Vickers	"	"	"	"	"	"	"	"	"	"			
Kanaros "	"	"	"	"	"	"	"	"	"	"	"			
Miaoules "	Swan Hunter	"	"	"	"	"	"	"	"	"	"			
Pindos "	Yarrow	"	"	"	"	"	"	"	"	"	"			
Themistocles "	Stephen	"	"	"	"	"	"	"	"	"	"			
Paul Coundouriotis	Odero, Genoa	1931	314·5	32	12	2	1480	45,000	40	4 4·7 in., 4 2-pr. A.A., 40 mines.	3 21-in. (T.)	156	—	—
Spetsai "	"	1931	314·5	32	12	2	1480	45,000	40	"	"		630	
*Aetos	Birkenhead	1911	293	27·7	9·6	2	1013	19,750	32	4 4-in., 2 2-pr. (50 mines)	3 21-in. (T.)	102	—	—
*Panther	"	"	"	"	"	"	"	"	"	"	"		260	
*Ierax	"	"	"	"	"	"	"	"	"	"	"		—	—
Salamis (<i>ex</i> -H.M.S. Borias)	Palmers	1930	323	32·3	10·0	2	1360	34,000	36	2 4·7-in.	4 21-in. (T.)		—	—
Navarion (<i>ex</i> -H.M.S. Echo)	Denny	1934	329	33·3	10·0	2	1370	36,000	36	3 4·7 in., 1 3-in.	4 21-in.		480	
TORPEDO BOATS—														
†Pergamos	Fiume	1914	178·4	18·8	5	2	237	5000	28½	1 11-pr.	3 18-in.	25	21	
†Proussa	"	1914	178·4	18·8	5	2	237	5000	28½	1 11-pr.	"		31	
CORVETTES—														
Apostolis (<i>ex</i> -British Flower Class)	Harland & W.	1940	205	33	13·5	1	1000	2750 (R.)	16	1 4-in., 2 6-pr.				
Kriezis "	A. & J. Inglis	1940	"	"	"	"	"	"	"					
Tombazis "	Fleming & F.	1941	"	"	"	"	"	"	"					
Saktouris "	Harland & W.	1940	"	"	"	"	"	"	"					
SUBMARINES—														
Papanicolis	Ch. de la Loire, Nantes	1926	203½	17·7	12·3	2	Surf. 567 Sub. 760	1300 1000	Surf. 14 Sub. 9·5	1 4-in., 1 2-pr. A.A.	6 21-in.	30		
Nereus	"	1927	226½	18½	12·6	2	689 945	1500 1200	14 9·5	1 4-in., 1 2-pr. A.A.	8 21-in.	42		
Matrozos	<i>ex</i> -Italian	1936	197½	21		2	650 855	1350 800	14 8·5	1 3·9-in.	6 21-in.	44		
Pipinos (<i>ex</i> -British Unity Class)	Vickers (Barrow)	1943	190	16	13	2	540 730	615 825	11·25 10	1 3-in.	4-6 21-in.	27		
Delphin "	"	1944	"	"	"	"	"	"	"	"	"			
Xifias "	Vickers (Walker)	1943	"	"	"	"	"	"	"	"	"			
Triaina	"	1944	"	"	"	"	"	"	"	"	"			
Argonaftic	"	1944	"	"	"	"	"	"	"	"	"			
Amfitriti	"	1942	"	"	"	"	"	"	"	"	"			

* Reconstructed by Messrs. J. S. White & Co., Cowes, 1924-25.

† Surrendered Austrian torpedo-boats. 3 others built 1907, laid up.

ITALY.—BATTLESHIPS.

Class	NAME	Standard displacement	Length (extreme)		Beam	Draught	Horse-power. Type of machinery and boilers	Where built	Date of launch	Date of completion	Cost	Armour						Armament		Speed	Fuel Coal	Com- ple- ment
			ft.	in.								Belt	Deck above Belt	Side Bulk- head	Gun position	Guns	Torpedo tubes					
b.	Impero *	41,000 tons	780	11	108	0	130,000 P.T. (G.)	Genoa (Ansaldo)	1889		£	in. 12	in. 5-9	in.	in.	in.	9 15-in., 12 6-in., 12 3-5-in., 40 A.A. M.G., 2 catapults, 3 aircraft.		knots 30	tons 3800	1600	
b.	Italia (ex-Littorio)	"	"	"	"	"	"	Genoa (Ansaldo)	1937	1940												
b.	Vittorio Veneto	"	"	"	"	"	"	Trieste	1937	1940												
b.	Andrea Doria †	23,622 tons	611	6	92	0	75,000 (G.)	Spezia	1913	1916		10-4 K.S.	1½ K.S.	6 K.S.	9½ K.S.	6 K.S.	10 12-6-in., 12 5-3-in., 10 3-5-in., 39 A.A. M.G., 1 catapult, 1 aircraft.		27	2000	1074	
b.	Calo Duilio †	"	"	"	"	"	"	Castellam- mare	1913	1915		"	"	"	"	"			"	"	"	
b.	Giulio Cesare †	"	"	"	"	"	"	Genoa (Ansaldo)	1911	1914		10-4½ K.S.	1½ K.S.	6 K.S.	9½ K.S.	5	10 12-6-in., 12 4-7-in., 8 3-9-in. A.A., 38 A.A. M.G., 2 catapults, 4 aircraft.		27	2000	1200	

* Building ceased through lack of materials.

† Reconstructed 1940.

‡ Reconstructed 1937.

ITALY.—CRUISERS.

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery and boilers	Where built	Date of launch	Date of completion	Cost	Armour		Armament		Speed	Fuel Oil	Complement
											Side Deck	Gan position	Guns	Torpedo tubes			
Abruzzi Class	Luigi di Savoja	7674 tons	613 9 ft. in.	61 0 ft. in.	17 ft. in.	100,000 P.T. (G.)	Odero-Terni, Orlando Spezia	1936	1937	£	in. Abt. 8	in.	10 6-in., 8 3-9-in. A.A., 8 7-5-in. A.A., 8 M., 4 aircraft, 2 catapults. Fitted for minelaying.	6 21" (T.)	knots 35 "	tons 1200 "	600 "
	Giuseppe Garibaldi	" "	" "	" "	" "	" (G.)	Cantieri Riuniti dell' Adriatico, Trieste	" "	" "	"	"	"	"	" (T.)	"	"	"
Attendolo Class	Eugenio di Savoia	7283 tons	610 3 ft. in.	57 4 ft. in.	16 4 ft. in.	110,000 (G.)	Ansaldo, Genoa	1935	1936	"	About 4½	"	8 6-in., 8 3-9-in., 8 7-5-in. A.A., 8 5-5-in. M., 1 catapult, 3 aircraft. Fitted for minelaying.	6 21" (T.)	38½ "	1200 "	550 "
	Emanuele Filiberto, Duca d'Aosta	" "	" "	" "	" "	"	Orlando, Leghorn	1934	1935	"	"	"	"	" (T.)	"	"	"
Condottieri "C" Class	Raimondo Montecuccoli	6828 tons	597 9 ft. in.	54 6 ft. in.	14-9 ft. in.	106,000 P.T.	Ansaldo, Genoa	" "	" "	"	"	"	8 6-in., 8 3-9-in. A.A., 8 7-5-in. A.A., 8 5-5-in. M., 2 aircraft, 1 catapult. Fitted for minelaying.	4 21" (D.)	37 "	1200 "	520 "
	Luigi Cadorna	5000 tons	559 6 ft. in.	51 1 ft. in.	14 ft. in.	95,000 (G.)	Stabilimento Tecnico Triestino, Trieste	1931	1933	"	2 2	"	8 6-in., 8 3-9-in. A.A., 8 7-5-in. A.A., 8 5 M., 1 catapult, 2 seaplanes.	4 21" (D.)	37 (38½ t) "	1000 "	530 "
Lcr. Regolo Class	Attilio Regolo	3600 tons	466 0 ft. in.	47 3 ft. in.	13 ft. in.	120,000 "	Genoa	1941	1942	"	"	"	8 5-3-in., 8 1-5-in., 12 M. A.A., carries mines.	8 21" (Q.)	41 "	"	"
	Sebastiano Arconte	" "	" "	" "	" "	"	Genoa	1941	1942	"	"	"	"	"	"	"	"
	Pompeo Magno	" "	" "	" "	" "	"	Ancona	1942	1943	"	"	"	"	"	"	"	"

ITALY.—FLOTILLAS.

Name or number	Where built	Launched	Dimensions			Number of screws	Standard Displacement	Horse-power	Maximum trial speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
DESTROYERS—													
Mitragliere	Ancona	1941	Feet 341½	Feet 34½	Feet	2	Tons 1650	45,000	Knots 39	4 4·7-in., several smaller	6 21-in. (T.)	240	Tons 500
Legionario	Orlando	"	"	"	"	"	"	"	"	"	"	"	"
Velite	"	"	"	"	"	"	"	"	"	A.A.	"	"	"
Granatiere	Palermo	1938	351	33½	"	2	1620	48,000	38	5 4·7-in., several smaller	6 21-in. (T.)	240	"
Artigliere	Orlando	1937	"	"	"	"	"	"	"	"	"	"	"
Fuciliere	Ancona	1938	"	"	"	"	"	"	"	A.A.	"	"	"
Carabiniere	Riva Trigoso	"	"	"	"	"	"	"	"	"	"	"	"
Nicoloso da Recco	Ancona	1929	351	33½	"	2	1590	52,000	"	6 4·7-in., several smaller	3 21-in. (T.)	"	"
Ardimentoso	Ansaldo, Genoa	1942	280	32½	"	2	1060	16,000	25	2 3·9-in. mines.	4 18-in. (D.)	"	"
Animoso	"	"	"	"	"	"	"	"	"	3 3·9-in.	"	"	"
Fortunale	Trieste	"	"	"	"	"	"	"	"	"	"	"	"
Augusto Riboty	Ansaldo	1916	340	32	9·8	2	1382	35,000	35	8 4-in., 4 2-pr. A.A., 100 mines.	2 18-in. (D.)	150	344
A. Oriani	Orlando	1936	350	33½	10	2	1570	48,000	39	4 4·7-in., 4 1·5-in. A.A., carry mines	6 21-in. (T.)	157	"
Grecale	Ancona	1934	350	33½	10	2	1449	44,000	38	4 4·7-in., 4 1·5-in. A.A.	6 21-in.	156	600
SUBMARINES—													
A. Cagni	Monfalcone	1940	285	25·5	17·2	2	Surf. 1461 Sub. —	4600	Surf. 18 Sub. 8·9	2 3·9-in., 4 M. A.A.	14 18-in. (D.)	52	"
Benedetto Brin	Taranto (Tosi)	1938	231	22½	"	2	— 1255	—	17 8·5	1 3·9-in., 4 M., 10 mines.	8 21-in.	"	"
Platino	Orlando	1942	197	21½	"	2	— 620	— 1350	16 14	1 3·9-in., 4 M.	6 21-in.	37	"
Nichello	"	"	"	"	"	"	— 844	— 800	8 8·5	"	"	"	"
Alagi	Adriatico	1936	197½	21	14·4	2	620 844	1350 800	14 8·5	1 3·9-in., 2 M.	6 21-in.	46	"
Giada	"	1942	"	"	"	"	— 620	— 1350	— 14	"	"	"	"
Diaspro	Adriatico	1936	197	21	14·4	2	844 800	800	8·5	1 3·9-in., 2 M.	6 21-in.	40	"
Atropo	Tosi, Taranto	1937	266½	23½	12½	2	1190 1550	2880 1300	17 8	1 3·9-in., 2 M., 30 mines.	6 21-in.	60	"
Zoea	"	"	"	"	"	"	"	"	"	"	"	"	"
Galatea	Monfalcone	1933	197	21	12	2	590 787	1350 800	14 8·5	1 3·9-in., 2 M.	6 21-in.	"	"
Otaria	Monfalcone	1934	240	23½	14½	2	860 1167	3000 1040	17·0 8·5	2 3·9-in., 2 M.	8 21-in.	"	"
Squalo	Cantiere N.	1930	229	19	14·5	2	810 1077	3000 1400	16·5 9	1 4-in., 2 M.	"	64	"
Jalea	Odero-Terni	1932	201·8	18·5	13	2	599 778	1200 800	14 8·5	1 4-in., 2 M.	6 21-in.	"	"
Ciro Menotti	Ansaldo, Spezia	1929	229	19	15·5	2	815 1078	3000 1300	17·5 9	1 4-in., 2 M.	8 21-in.	50	"
Fratelli Bandiera	Monfalcone	"	"	"	"	"	"	"	"	"	"	"	"
Luciano Manara	"	"	"	"	"	"	"	"	"	"	"	"	"
Ruggiero Settimo	Taranto	1930	"	"	"	"	797 134	3000 1400	"	"	"	"	"
M. Bragadino	Taranto (Tosi)	1929	233	18·6	14	2	802 1051	1500 1000	14 8	1 4-in., 2 M., 24 mines.	4 21 in.	50	41
F. Corridoni	"	1930	"	"	"	"	"	"	"	"	"	"	"
Dandolo	Monfalcone	1937	240	23½	"	2	1121 1550	3000	17·0 8·5	2 3·9-in.	8 21-in.	"	"
Marea	"	1942	235	"	"	2	900	2400	17 8·5	1 3·9-in.	6 21-in.	"	"
Vortice	"	1942	235	"	"	2	"	"	"	"	"	"	"
Goffredo Mameli	Taranto	1928	212	21½	"	2	816 994	3000 1100	17 9	1 4-in.	6 21-in.	50	63
Tito Speri	"	"	"	"	"	"	"	"	"	"	"	"	"
Procida	"	"	"	"	"	"	"	"	"	"	"	"	"

Italy—continued.

Name or number	Where built	Launched	Dimensions			Number of screws	Standard Displacement	Horse-power	Maximum trial speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
			Feet	Feet	Feet		Tons		Knots				Tons
MIDGET SUBMARINES													
CB 8-26	Various Yards	1941-2	52½	10			36	480	7		2	4	
								12	5		18-in.		
CM I	Monfalcone	1945	106	10			80		13		2	6	
							90		6		18-in.		
TORPEDO BOATS—													
Monzambano	Orlando	1923	280	26		2	1000	22,000 (G.)	33½	4 4-in.	6 18-in.	105	
Orione	Palermo	1937	293	31		"	860	16,000 (G.)	28	2 3-9-in., 10 M.	4 18-in. (D.)		
Aliseo	Castellamare	1942	280	32½		"	1000	"	25	"	"		
Orsa	Palermo	1937	293	31		"	860	"	28	"	"		
Ariete	Ansaldo	1943	271	27		"	800	"	30	"	6 18-in. (T.)		
Indomito	Riva Trigoso	1943	280	32½		"	1000	"	25	"	"		
Clio	Ansaldo	1938	267	26		"	680	19,000 (G.)	34	3 3-9-in., 6 1-5-in.	4 18-in.		
Calliope	"	"	"	"		"	"	"	"	"	"		
Libra	Fiume	"	"	"		"	"	"	"	"	"		
Aretusa	Ansaldo	"	"	"		"	"	"	"	"	"		
Cassiopea	Riva Trigoso	1936	269	27		"	650	"	"	"	"		
Sagittario	Fiume	"	"	27		"	"	"	"	"	"		
Sirio	"	"	"	"		"	"	"	"	"	"		
Nicola Fabrizi	Odero	1918	240	24		"	635	15,000 (G.)	32½	4 4-in.	"		
Giacinto Corini	"	"	"	"		"	"	"	"	"	"		
Artorio Mosto	Naples	1915	"	"		"	620	"	"	5 4-in.	"		
Guisepe C. Abba	Odero	"	"	"		"	"	"	"	"	"		
Rosalino Pilo	"	"	"	"		"	"	"	"	"	"		
Guisepe Missori	"	"	"	"		"	"	"	"	"	"		
E. Giovannini	Naples	1922	180	19		"	180	2,400 (R.)	25	2 4-in.	2 18-in. (D.)		
CORVETTES—													
Ape	Naples	1942	207	28			570	3,400 (Dies. elect.)	18½	1 3-9-in., several small A.A.	2 18-in.		
Chimera	Trieste	"	"	"		"	"	"	"	"	"		
Cormorano	"	"	"	"		"	"	"	"	"	"		
Danaide	Genoa	"	"	"		"	"	"	"	"	"		
Driade	"	"	"	"		"	"	"	"	"	"		
Fenice	"	"	"	"		"	"	"	"	"	"		
Flora	"	"	"	"		"	"	"	"	"	"		
Folaga	"	"	"	"		"	"	"	"	"	"		
Gabbiano	"	"	"	"		"	"	"	"	"	"		
Gru	"	"	"	"		"	"	"	"	"	"		
Ibis	"	"	"	"		"	"	"	"	"	"		
Minerva	Trieste	"	"	"		"	"	"	"	"	"		
Baionetta	Milan	"	"	"		"	"	"	"	"	"		
Pellicano	Genoa	"	"	"		"	"	"	"	"	"		
Pomona	Trieste	"	"	"		"	"	"	"	"	"		
Scimitarra	Milan	"	"	"		"	"	"	"	"	"		
Sfinge	Trieste	"	"	"		"	"	"	"	"	"		
Sibilla	"	"	"	"		"	"	"	"	"	"		
Urania	"	"	"	"		"	"	"	"	"	"		
Regina Elena	"	"	"	"		"	"	"	"	"	"		

MINELAYERS.—A small number of ex-merchant vessels.

MINESWEEPERS.—About 40 in number, 150 tons, 14 knots, 1 3-in. gun.

OIL TRANSPORTS.—Tarvisio, 10,910 tons, 11 knots, 4 4-7-in., 2 3-in.; Urano, 10,550 tons, 11 knots, 2 4-7-in., 2 3-in.; Prometeo, 1,080 tons, 11 knots, 2 3-in.; Nettuno, 9,555 tons, 14 knots, 3 4-7-in., 2 3-in.; Cocito, Lete, 1,162 tons, 10 knots, 3 3-in.

SURVEYING VESSELS.—Cherso, 3,988 tons, 10½ knots, 4 4-7-in. guns; Azio (1927), 615 tons, 15 knots, 2 4-in., 1 3-in.

PATROL VESSELS.—Rimini (1912), 319 tons, 9½ knots, 1 3-in. gun; Illiria (1918), 654 tons, 11 knots.

TRAINING SHIPS.—Cristoforo Colombo (Castellamare, 1928), 2,787 tons, 10 knots (Diesel-electric), 4 3-in. guns, 2 A.A. M.G.; Amerigo Vespucci (Castellamare, 1931), 3,543 tons, 1,800 H.P. (Diesel-electric), 11 knots, 4 3-in. A.A., 2 A.A. M.G.

SUBMARINE DEPOT SHIP.—Pacioti (1924), 2,730 tons, 19 knots, 4 3-in. A.A.; Quarnerolo (1896), 1870, 13 knots.

CABLE SHIP.—Glasone, 1,192 tons, 250 ft., 15 knots.

WATER CARRIERS.—Istria, 2,900 tons, 10 knots, 1 4-7-in., 1 3-in.; Po, 11½ knots, 2 4-in., 4 M.G.; Tirso, 9½ knots, 4 M.G.; Mincio, Bormida, 645 tons, 9 knots; Scia, 1,050 tons, 9½ knots, 4 M.G.; Adige (1928), 780 tons, 8 knots; Arno (1929), 630 tons, 9 knots; Garda, Verbano, Metauro (1934), 592 tons, 9 knots; Frigido (1912), 398 tons, 9 knots; Vippacco, Isarco (1925), 265 tons, 9 knots; Aterno (1914), 250 tons, 8 knots, and many others.

LIGHTHOUSE TENDERS.—Scilla, 350 tons, 9 knots, 1 3-in.; Lido, 226 tons, 12 knots, 1 3-in.

SLOOP.—Eritrea, 2,172 tons, 20 knots, 4 4-7-in. guns, fitted for minelaying.

MOTOR VEDETTE.—Vigilante, Vedetta (1938), 85½ ft., 70 tons, 400 H.P. (D.), 12 knots, 1 3-in.

HOSPITAL SHIPS.—Gradiaca, Toscana, Principessa Giovanna.

SALVAGE SHIPS.—Ciclope (1903), 1,050 tons, 13-5 knots, 1 3-in.; Titano (1913), 828 tons, 14 knots, 1 3-in.

NETHERLANDS

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery and boilers	Where built	Date of Launch	Date of completion	Cost	Armour					Armament		Speed	Fuel Com- ple- ment		
											Belt	Deck	Side Bulk- above belt	Gun position	Heavy guns	Secondary	Guns		Torpedo tubes	Oil	
		tons	ft.	ft.	ft.					£	in.	in.	in.	in.				in.			24-in., 16 2-pr., 16- 20-mm.	5-9-in. guns.	21-in.	knots	tons
E.C.	Karel Doorman (<i>ex-Nairana</i>)	13,825	524	66	20	10,700	John Brown (Clydebank)	1943	1943											16	—
Cr.	Eendracht	8350	600				Rotterdam Dry Dock Co.	Bdg. 1944													
Cr.	Zeven Provinciën	8350	600				Rotterdam Wilton- Fijndord														
I.Cr.	Tromp	3350	433	40½	15	56,000	Amsterdam	1937	1938		2	1		10 H.S.	3 H.S.	6 5-9-in. in Tromp ; 10 4-in. in Heems- kerck, 4 7-5-in. A.A., 4 5-in., 1 seaplane.	6 21-in. (T.)	32½	—	330	
I.Cr.	Jacob van Heems- kerck	"	"	"	"	"	"	1938	1941 (in UK)		"	"							"	860	"

MINELAYERS.—Douwe Aukes (1922), 687 tons, 13 knots, 3 3-in. A.A., 2 m., 130 mines; Medusa (1911), 593 tons, 11-5 knots, 3 3-in., 1 m., 65 Mines; Willen van der Zaan, 1,350 tons, 15 knots, 2 4-7-in., 4 1-5-in., 4 m., 120 mines; Jan van Brakel (1936), 50 tons, 15 knots, 2 3-in., 1 1-pr., 4 m.

MINESWEEPERS.—(Bathurst Class, *ex-R.A.N.*), 1941: Ternate, Boerce, Batjan, Ceram, Tidore, Morotai, Ambon, Banda, 650 tons, 16 knots, 1 4-in., 2 20-mm.; Abraham van der Hulst, Pieter Florisz, Wilhelm van Ewijck, Jan van Gelder, Abraham Crinissen (1937), 460 tons, 15½ knots, 1 3-in., 4 40-mm.

SURVEYING VESSELS.—Hydrograf (1911), 260 tons, 9 knots; Eijlerts de Haan (1919).

SUBMARINE DEPOT SHIP.—Cornelius Drebbel (1915), 688 tons, 170 H.P. (Diesel), 6 knots, 1 1-5-in.

SCHOOPERS.—Van Kinsbergen (1939), 1,760 tons, 25 knots, 4 4-7-in. guns; Flores Soemba (1927), 1,800 tons, 14½ knots, 3 5-9-in., 6 m.; Van Speijk (1940), 1,268 tons, 4 4-7-in., 4 40-mm.

GUNBOATS.—Gruin, 530 tons (1915), 4 1-1-in., 2 m., 14 knots; K 3 (1941), 1,300 tons, 4 4-7-in., 4 40-mm.

MOTOR MINESWEEPERS.—16 in number, M.M.S. and 6 in number B.Y.M.S.

HOFFICIAL SHIPS.—Oranje, Tjitalengka, Ophir, Tasman, Maetsuycker, Meichlor Treve.

TRAINING SHIPS.—Christian Cornelis, Van Speijk, Schorpioen, Bufel, Noord-Brabant.

BOOM DEFENCE VESSELS.—2 *ex-British* (Barglow and Barneburst).

Netherlands.

Name or number	Where built	Launched	Dimensions			Number of screws	Displacement	Horse-power	Maximum speed	Armament	Torpedo tubes	Complement	Fuel
			Length (extreme)	Beam	Draught								Coal Oil
DESTROYERS—			Feet	Feet	Feet		Tons		Knots				Tons
Jan van Galen (<i>ex</i> -H.M.S. Noble)	Denny Bros.	1941	356½	35½		2	1760	40,000	36	6 4·7-in., 1 4-in., 1 m.p.p.	5 21-in.		485
Tjerk Hiddes (<i>ex</i> - H.M.S. Nonpareil)	"	"	"	"		"	"	"	"	6 4·7-in., 1 m.p.p.	10 21-in.		"
Piet Hien (<i>ex</i> - H.M.S. Serapis)	Scotts	1943	362½	35½		2	1700	40,000	36	4 4·7-in., several small A.A.	8 21-in. (Q.)		
Kortenaer (<i>ex</i> - H.M.S. Scorpion)	Camnall Laird	1942	"	"		2	"	"	"	"	"		
Evertsen (<i>ex</i> - H.M.S. Scourge)	"	"	"	"		"	"	"	"	"	"		
Banckert (<i>ex</i> - H.M.S. Quilliam)	Hawthorn Leslie	1941	"	"		"	"	"	"	"	"		
CORVETTE—													
Johan Mauritz (<i>ex</i> - H.M.S. Ribble)	Simons, Renfrew	1943	301½	36½	12½	2	1450	5500 (R.)	20	2 4-in. HA/LA, 4/20 mm.			
SUBMARINES—							Surf. Sub.						
Zwaardvisch (<i>ex</i> -H.M.S. Talent)	Vickers (Barrow)	1943	265	27·5	12	2	1090 1575	2500 1450	15½ 9	1 4-in.	6 21-in.	53	
Tijgerhaai (<i>ex</i> - H.M.S. Tarn)	"	1944	"	"	"	"	"	"	"	"	"	"	
Dolfijn (<i>ex</i> -H.M.S. P.47)	"	1942	197	16·1	12·9	2	540 730	615 825	11½ 10	1 3-in.	4 21-in.	27	
O 19	Rotterdam	1938	265	24·6	12·5	2	966 1020	5000 —	17	1 3·5-in., 2 1·5-in.	8 21-in.	36	
O 21	De Schelde	1939	254½	25½	13	2	888 1205	5000 —	20 9	1 3·5-in.	8 21-in.	37	
O 23	Rotterdam	1931	254½	25½	13	2	888 1205	5000 —	20 9	1 3·5-in.	8 21-in.	37	
O 24	"	1924	"	"	"	"	"	"	"	"	"	"	
O 27	Wilton Fijenoord	1940	"	"	"	"	"	"	"	"	"	"	

NORWAY.

Class	NAME	Normal Displacement	Length (extreme)	Beam	Draught	Horse-power	Where built	Date of launch	Date of completion	Cost	Armour					Armament		Speed	Fuel	
											Belt	Deck above belt	Side Bulk-head	Gun position	Heavy Guns	Torpedo tubes	Coal		Oil	
											in.	in.								
											7	2			in.					
											n.s.				8					
											n.s.				n.s.					
c.d.s.	Harald Haarfagre	tons 3858	ft. 304	ft. 48½	ft. 17½	4500	Elswick	1896	1898	£ 300,000					in.	6 4-1/2-in., several smaller A.A.	3 18-in.	knots 16-5	tons 550	249
c.d.s.	Eidsvold	4100	310	50½		4500	"	1900	1903							2 8-2-in., 6 5-9-in. 8 3-in.	2 18-in.	"	"	270

PATROL VESSELS.—Nordkapp (1937), 273 tons, 13.7 knots, 11.85-in.; Vestfjord, Stathav, King Haakon VII (ex-U.S. P.C.467), Seaja (1937).
 MINELAYERS.—Laugen (1918), 335 tons, 94 knots, 2 3-in., m., 50 mines; old gunboats, refitted as minelayers: Tyr, Vidar, Brage, Nor, Vale, and Uller, 230-280 tons, armed with one 4.7-in. and other guns; Olav Trygvasson, minelayer and training ship, built at Horten, 1,747 tons, 21½ knots, 21½ knots, 6,000 H.P., 4 4.7-in. and 1 3-in. A.A. guns, and 2 t.r.s. (18-in.), 280 mines.
 MINESWEEPERS.—Otra (1940), 360 tons, 13.5 knots, 11.5-in., 2 m.; Bangor Class (ex-R.N.) Glomma, Tana, Qualicum, Romney, Sidmouth, 650 tons, 14 knots, 1 3-in.

MOTOR LAUNCHES.—ex-British, 3 in number.

CORVETTES.—(ex-British Flower Class), Nordlykn, Soerøey, Andenes (1941), 1,000 tons.

TRAWLERS.—A number of British Isles Class.

WHALES.—A large number of miscellaneous craft.

DEPOT SHIPS.—Nordvard (1925), 4,000 tons; Heimdal (1892), 660 tons, 12 knots, 4 12-pdr.; Ranen (1918), 463 tons.

Norway.

Name or number	Where built	Launched	Dimensions			Number of screws	Displacement	Horse-power	Maximum trial speed	Armament	Torpedo tubes	Complement	Fuel	
			Length (extreme)	Beam	Draught								Coal	Oil
DESTROYERS—														
Bergen	Scotts	1945	Feet 363½	Feet 35½	Feet 10	2	Tons 1710	40,000	Knots 36	4 4·5-in., 1 40-mm.	4 21-in.			Tons
Stavanger	Yarrow	1945	"	"	"	"	"	"	"					
Trondheim	"	1944	"	"	"	"	"	"	"					
Oslo	Scotts	1945	"	"	"	"	"	"	"					
Stord	J. S. White	1943	362½	35½	10	2	1710	40,000	36	4 4·7-in.	8 21-in. (Q.)			
<i>Hunt Class—</i>														
Narvik	Cammell Laird	1942	280	31½	8	2	1050	19,000	29	4 4-in.	2 21-in.			
Arendal	"	1941	"	"	"	"	"	"	"	6 4-in.				
Draug	Horten	1908	226	23·5	8·8	2	540	7500	27·0	6 4·7-in.	3 18-in.	71	95	6
TORPEDO BOATS :														
<i>First Class—</i>														
Brand	Horten	1900	130·9	16·0	6·9	1	100	1100	21	2 M., 3 0·79-in.	3 18-in.	19	17	—
Laks	"	1900	126·4	15·0	6·9	1	100	1150	21·8	2 M.	2 18-in.	19	"	—
Sleipner	"	1936	236·3	25·5	6·9	2	625	12,500	30	3 3·9-in., 1 1·5-in. A.A.	2 21-in.	72	—	100
Gyller	"	"	"	"	"	"	"	"	"	"	"	"	"	"
Odin	"	1939	"	"	"	"	"	"	"	"	"	"	"	"
Tor	Fredrikstad	"	"	"	"	"	"	"	"	"	"	"	"	"
Balder	Horten	"	"	"	"	"	"	"	"	"	"	"	"	"
<i>Second Class—</i>														
Kvik	Horten	1898	115	14·5	6·0	1	73	650—750	19—20	2 1·46-in., 1 0·79-in.	2 18-in.	14	11	—
Blink	"	1903	"	12·5	"	"	"	"	"	"	"	"	"	16
Teist	"	1906—7	133	14·5	6·5	1	100	1600	25	2 3-pr.	"	18	—	—
MOTOR TORPEDO BOATS— (10 in number)														
Fairmile	Fairmile	1943	115	21½	5½		102	4800	30	1 6-pr., 1 2-pr., 6 M.	2 21-in.	20		
SUBMARINES—														
<i>Ex-British Unity Class</i>														
Uthang	Vickers (Walker)	1944	196	16·1	12·9	2	540 730	615 825	11½ 10	1 3-in.	4 21-in.	27		
Utvaer	Vickers (Barrow)	1943	"	"	"	"	"	"	"	"	"	"		
Utstein	"	"	"	"	"	"	"	"	"	"	"	"	"	"
Utsira	"	"	"	"	"	"	"	"	"	"	"	"	"	"
Ula	"	"	"	"	"	"	"	"	"	"	"	"	"	"

SOVIET UNION.—BATTLESHIPS.

Class	NAME	Normal displacement	Length (extreme)	Beam	Draught	Horse-power	Where built	Makers of engines	Date of launch	Date of completion	Cost	Armour				Armament		Speed	Fuel			
												Belt	Deck	Side above belt	Bulk-head	Gun position	Guns		Torpedo tubes	Coal	Oil	
b.	Sovietaki Soyuz (ex-Lenin)	tons 35,000	ft. 800	ft.	ft.		Baltic Ship-building Yard, Lenin-grad	Baltic Ship-building Yard, Lenin-grad	Bdg.		£	in.	in.	in.	in.	16-in., 5-9-in.		knots				
b.	Archangel *	29,150	620½	101½	29	40,000 Y.	Baltic Ship-building Yard, Lenin-grad	Parsons	1915	1916	2,570,504	13-4	4-1	6	6-4	11	6	8 15-in., 12 6-in., many smaller.	23			
b.	Sevastopol (ex-Farizhskaya Kommuna) †	23,000	594	87	27½	42,000 P.T.	Baltic Works, Lenin-grad	Baltic Works, Lenin-grad	1911	1915		9-5	3			12-10	6	12 12-in., 16 4-7-in., 10 3-in. A.A., 8 in., and smaller; 2 seaplanes. (Variation of secondary armament between ships.)	4 (sub.) 18-in.	23	2000 1000	1125
b.	Oktabrskaya Revolyutsiya (ex-Gangut) ‡	23,000	594	87	27½		"	"	1911	1915												
b.	Petrovskiylovsk (ex-Marat) ||	23,606	594	87	31		"	"	1911	1911												
cls.	Väinämöinen (ex-Finnish)	3,900	295	54	14½	4800	Crichton Vulcan Abo.	Crichton Vulcan Abo.	1930	1932		2	1				4 10-in. (twin), 8 4-7-in. (twin), 4 smaller.	15				

* Ex-H.M.S. Royal Sovereign, on loan to U.S.S.R.

† Modernised, 1937.

‡ Modernised, 1933.

|| Modernised 1931, possibly scrapped due to damage.

SOVIET UNION.—CRUISERS.

Class	NAME	Normal displacement	Length (extreme)	Beam	Draught	Horse power	Where built	Date of launch	Date of completion	Cost	Armour		Armament		Speed	Fuel	
											Belt	Gun position	Guns	Torpedo tubes		Coal	Oil
		tons	ft.	ft.	ft.					£	in.	in.			knots	tons	
cr.	Kalinin	7725	613½	58	18	120,000	Komsomolsk		1942				9 7.1-in., 6 3.9-in., many smaller.	6 27-in.	3½		
cr.	Kaganovitch	"	"	"	"	"	"	Bldg.	1944				"				
cr.	Chkalov ?	"	"	"	"	"	Leningrad	"	"				"				
cr.	Chapayev ?	"	"	"	"	"	"	"	"				"				
cr.	One other	"	"	"	"	"	"	"	"				"				
cr.	Kuibyshev ?	"	"	"	"	"	Nikolaev	"	"				"				
cr.	One other	"	"	"	"	"	"	"	"				"				
cr.	One other	"	"	"	"	"	Komsomolsk	"	"				"				
cr.	Kirov	7725	613½	58	18	105,000	Leningrad	1936	1937		3		9 7.1-in., 4 4-in., 8 7.5-in. A.A., 2 aircraft.	6 27-in. (T.)	34		624
cr.	Maxim Gorki	"	"	"	"	"	"	1937	1939		2		"		"		
cr.	Molotov	"	"	"	"	"	"	1936	1940		3		"		"		
cr.	Voroshilov	6000	575	54	17½	72,000	Kiel	1936	1940		1		9 5.9-in., 8 3.5-in.	12 27-in.	32		
cr.	Admiral Makarov (ex-Nurnberg)	15,200	682	71	20	130,000	Bremen	1939	1941		4		8 8-in., 12 4.7-in.	12 27-in.	32½		
cr.	— (ex-Lutzow)										3½		10 6-in., 7 3-in.	6 27-in. (T.)	33		—
cr.	Murmanuk *	7050	555½	55½	13½	90,000 P.T. (G.)	Philadelphia (Cramp)	1921	1923		1½		4 5.7-in., 3 3-in. A.A., 300 mines	12 27-in.	25	1800	
m.cr.	Mart	3500	410						1936		2		4 7.7-in., 4 3-in. A.A., 4 4-in. A.A., 4 M., 100 mines, 2 sea-planes.	12 27-in.	29½	540	650
cr.	Krasni Kavkaz (ex-Ad. Lazarev)	7600	535	51½	10	60,000	Nikolaev	1916	1930		3		"			680	
cr.	Krasni Kym (ex-Profintern)	7200	520	50½	18½	55,000 P.T. (Y.)	Reval	1915	1925		1		15 5.7-in., 4 4-in. A.A., 4 3-in. A.A., 2 aircraft, 100 mines.	12 27-in.	29½	540	630

* Ex-U.S.S. Milwaukee, on loan from U.S. Navy.

GUNBOATS.—Krazni Vostok, Sun Yat Sen, Lenin, Chicherin (1910), 950 tons, 11 knots, 1 6-in., 1 3-in.; Bednota, Krasnoe-Znamya, Rabochi, Proletari, Krasni Buryat, Krasni Mongol, Krasni Moryak (1907), 11 knots, 190 tons, 2 4-1/2-in.; Krasni Azerbaizhan, Lenin, No. 3 (1909), 640 tons, 12 knots, 2 4-in., 2 3-in.; Krasnaya Gruzuya (1906), 1,100 tons, 9 knots, 2 5-1/2-in., fitted for minelaying; Altvater, Bakinsky Rabochi, Markin (1905), 710 tons, 25 knots, 3 4-in., 2 m.; Krasnaya Zvezdo (1906), 1,300 tons; Krasnoe Znamya (1895), 1,500 tons, 5 5-in., 2 3-in.; Karjala (1918), ex-Finnish, 350 tons, 14 knots, 2 3-in.; Yrjo and Aunus (ex-Finnish); Presidentas Smetone, 380 tons, 2 3-in., 16 knots; Laine, 400 tons, 12 knots, 2 7/8 mm.; Marthus, 80 tons, 2 3-in.; and many others.

MINELAYERS.—25 Oktyabrya (1873), 4,500 tons, 11 knots, 4 3-in., 600 mines; Suurop, Ristina (1905), 450 tons, 12 knots, 1 3-in.; Marti, 12 others.

MINEWEEPERS.—Mikula, Iskra, 500 tons, 1 3-in.; Zapal, Zmei, Kluz (1911), 180 tons, 11 knots, 1 3-in.; Djaliia (1926), 359 tons, 10 knots, 2 3-in.; Dorotea (1924), 443 tons, 10 knots, 2 3-in.; Udarnick (1917), 185 tons, 10 knots, 1 3-in.; Nos. 1-VI (1935), 400 tons, 16 knots, 1 4-in., 1 m.g.; Lahna and Kuore (1937), ex-Finnish, 16 tons, 10 knots; Fugas, Kapsul, Paravan, Podsekateo, Provodnik, Strela, Patron, Bui, Tcheka, Gafel, Tros, Verp, Zapal, Vziriv, Krambol (1933-40), 500 tons, 16 knots, 1 4-in., 1 1-7-in.; Keri, Vaindlo, 50 tons, 9 knots; Takhona, 45 tons, 12 knots. Many acquired from U.S. Navy and R.N.

OILERS.—Gornjak (1898), 1,576 tons, 12 knots; Zheleznotorozhnik, 2,000 tons, 10 knots; 13 others.

ICE-BREAKERS.—Josef Stalin, Kaganovitch, A. Mikoian (1938-40), 11,000 tons, 15 knots, 3 seaplanes; Lenin, 5,700 tons, 19 knots; Krassin (1917), 10,000 tons, 16 knots; Sadko (1913), 1,616 tons, 14 knots; Maligin (1912), 1,635 tons; Sedov, Rusamov, Sibiryakov (1909), 1,140 tons, 12 knots; Truvor (1896), 1,450 tons, 13 knots; Davidov, 1,525 tons, 15 knots; Dobriniya Nikitich (1916), 1,664 tons; Feodort Litke (1909), 3,000 tons, 17 knots; V. Molotov (building); S. Makarov (1916), 4,000 tons, 14 knots; Yermak (1898), 8,000 tons, 14 knots; 30 others.

DEPTO SHIPS.—Krasni Gorn (1911), 1,892 tons, 10 knots; Soviet, Antoni, Krasny Moryak and others.

ROSSIYA, 5,200 tons, 12 knots; Oka (1914), 1,982 tons, 10 knots; Serp-i-Molot (1900), 6,000 tons, 11 knots; Smolni, 3,200 tons, 10 knots; Kommuna (1913), 2,400 tons, 10 knots; Sovetskaya

TRAINING SHIPS.—Svir, 10,000 tons gross, 15 knots; Martinov, Osovalakhim, Artemev, Kursant, Ucheba, Praktika (1907), 300 tons; Konsomolots (1902), 11,000 tons, 18 knots, 4 3-in.; Amur, 3,000 tons, 13 knots, 1 4-7-in.; Leningrad Soviet (1895), 1,300 tons, 10 knots.

GUARDSHIPS.—Razvedchik (1904), 100 tons, 16 knots, 2 3-pr.; Dzerzhinski, Kirov (1934), 800 tons, 21 knots, 2 4-in., 4 1-5-in. A.A.; Five vessels, 200 tons, 16 knots, 1 4-7-in.; Eight vessels, 350 tons, 20 knots, 1 4-1/2-in.

WATERTANKERS.—Vodolei I and II, 660 tons, 9 1/2 knots, 3 others.

PATROL VESSELS.—Khorek, Kunitsa, Laska, Vidra (1936-37), 180 tons, 12 knots, 2 3-in.; 40 others.

FISHERY PROTECTION VESSELS.—Alvin, Gorislava.

SUBMARINE CHASERS.—Many acquired from U.S.N.

5 SALVAGE VESSELS.

SOVIET UNION.—FLOTILLAS.

Some of the details given below are uncertain.

Name or number	Where built	Launched	Dimensions			Number of screws	Displacement	Horse-power	De-signed speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
FLOTILLA LEADERS—			Feet	Feet	Feet		Tons		Knots				Tons
Leningrad	Leningrad	1935	400	38½	14	2	1950	65,000	33	5 5-1-in., 2 3-in. A.A.	21-in.		
Minsk	"	1936	"	"	"	"	"	"	"	"	"		
Tbilisi	Vladivostok	1937	"	"	"	"	"	"	"	"	"		
Baku	"	1937	"	"	"	"	"	"	"	"	"		
Tomsk	"	1942	"	"	"	"	"	"	"	"	"		
Tashkent	"	1942	"	"	"	"	"	"	"	"	"		
DESTROYERS—													
— (Narvik type)	Bremen	1942	414½	39½		2	2600	70,000	37	5 5-9-in., 4 1-5-in.	8 21-in.		
— (Roeder type)	Hamburg	1935	393½	37½		2	2360	70,000	38	5 5-in., 4 1-5-in.	8 21-in.		
— (Roeder type)	"	1935	"	"	"	"	"	"	"	"	"		
— (Roeder type)	Bremen	1938	385½	38½		"	2290	55,000	36	5 5-in., 4 1-5-in.	8 21-in.		
— (Elbing)	Schichau	1942	337½	32½		"	1200	32,000	32	4 4-in., 4 1-5-in.	6 21-in.		
— (Roumanian)	Naples	1928	334½	31½			1785	42,000	38	5 4-7-in., 1 3-in.	6 21-in.		
— (Roumanian)	"	1924	"	"			"	"	"	"	"		
— (Roumanian)	"									"	"		
Improved Gordy Class :													
Silny	Leningrad	1938	370	33½		2	1650	40,000	37	4 5-1-in., 2 1-5-in. A.A.	6 21-in.		
Storozhevoi	"	1938	"	"		"	"	"	"	"	"		
Slavni	"	1939	"	"		"	"	"	"	"	"		
and about 7 others													
Gordy Class :													
Boiki	Nikolaev	1938	375	33½		2	1650	40,000	37	4 5-1-in., 2 1-5-in. A.A.	6 21-in.		
Gromki	"	"	"	"		"	"	"	"	"	"		
Grozny	"	"	"	"		"	"	"	"	"	"		
Gremyashchi	"	"	"	"		"	"	"	"	"	"		
Grozyashchi	"	"	"	"		"	"	"	"	"	"		
Goryaschi	"	"	"	"		"	"	"	"	"	"		
Bodry	"	"	"	"		"	"	"	"	"	"		
Rezevi	"	1939	"	"		"	"	"	"	"	"		
Riyani	"	"	"	"		"	"	"	"	"	"		
and about 10 others													
Town Class :													
Dostoini	Newport News	1918	314	32	11	2	1100	26,000	35	1 4-in., 1 12-pr.	6 21-in.		
Zharky	Fore River	"	"	"	"	"	"	"	"	"	"		
Zhyvuchi	Marg Island	"	"	"	"	"	"	"	"	"	"		
Derzyki	Bath Iron	"	"	"	"	"	"	"	"	"	"		
Zhguchi	N.Y.S.B.	"	"	"	"	"	"	"	"	"	"		
Doblestni	Fore River	"	"	"	"	"	"	"	"	"	"		
Zhostky	"	"	"	"	"	"	"	"	"	"	"		
Druzhni	Wm. Cramp	"	"	"	"	"	"	"	"	"	"		
Karl Liebknecht	Leningrad	1914	321	31	9-25	2	1610	32,000	29	4 4-in., 1 3-in. A.A., 2 M., 80 mines.	9 18-in. (T.)	110	400
Uritsky	"	1914	321	"	"	"	"	"	"	"	"	"	"
Stalin	"	1914-	315	31	10	"	1260	30,000	28	"	"	"	"
Volkov	"	15	"	"	"	"	"	"	"	"	"	"	"
Shtorm	Nikolaev	1932	236	24	10	"	700	13,200	29	2 4-in., 3 3-in., 2 M., 40 mines	9 18-in.	72	"
Shkval	Leningrad	1933-	251	24	10	"	700	13,200	29	2 4-in., 3 3-in., 2 M., 40 mines	9 18-in.	72	"
Groza	"	39	"	"	"	"	"	"	"	"	"	"	"
Metall	"	"	"	"	"	"	"	"	"	"	"	"	"
Smertsch	"	"	"	"	"	"	"	"	"	"	"	"	"
Uragan	"	"	"	"	"	"	"	"	"	"	"	"	"
Vyuga	"	"	"	"	"	"	"	"	"	"	"	"	"
Grom	"	"	"	"	"	"	"	"	"	"	"	"	"
Vikhr	"	"	"	"	"	"	"	"	"	"	"	"	"
Tucha	"	"	"	"	"	"	"	"	"	"	"	"	"
Molniya	Vladivostok	"	"	"	"	"	"	"	"	"	"	"	"
Zarnitza	"	"	"	"	"	"	"	"	"	"	"	"	"
Burun	Leningrad	"	"	"	"	"	"	"	"	"	"	"	"
and six others													
FRIGATES—													
Tacoma Class (ex-U.S.N.) :													
29 in number	U.S.A.	1943	285½	37½	10	2	1430	5500 (R)	20	3 3-in. H.A./L.A. 2 40-mm., 9 20-mm.			

Soviet Union—continued.

Name or number	Where built	Launched	Dimensions			Number of screws	Displacement	Horse-power	De-signed speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
SLOOP— — (ex-H.M.S. Lark)	Scotts	1943	300	38½		2	1350	4300	20	6 4-in., 10 20-mm.			
GUARD SHIPS— Dserschinski	Ansaldo	1934	250	27	9	3	800	5400	20	2 4-in., 4 1·5-in.	9 18-in.	120	44
Kirov and 30 others	"	"	"	"	"	"	"	"	"	"	"	"	"
SUBMARINES— Ex-German:							Surf. Sub.		Surf. Sub.				
Type XXI (4 in number)	Germany	1944	251½	26	20½	2	1621 1819	4000 5000	15 16	4 A.A.	6 21-in.		
Type IX C (1 in number)	"	1942	252	22		2	1120 1232	4400 1000	18·3 7	1 40-mm., 4 20-mm.	6 21-in.		
Type VII B, VII C (4 in number)	"	1942	218	20		2	753 857	2310 750	17·9 8·0	1 40-mm., 4 20-mm.	6 21-in.		
Type XXIII	"	1944	113½	10		2	232 256	575 580	9 12		2 21-in.		
Type II B	"	1936	136½	13		2	250 295	700 360	13 7	1 20-mm.	3 21-in.		
Pravda : About 20 boats	Leningrad	1935 —41	320				1700	4000		2 4·1-in., 2 20-mm.	10 21-in.		
" S " Class : About 20 boats		1937 —40	250				1100	4000	18	1 4·1-in.	6 21-in.		
" J " Class : About 20 boats		1929 —36	240				1100	4000	18	1 4·1-in., 1 20-mm.	6 21-in.		
" Schich " Class : About 60 boats		1934 —40	220				620 820	1600	13		6 21-in.		
Unity Class : B2, B3, B4	Vickers (Barrow)	1938 —42	190	16	13		540 730	615 825	11·25 9	1 3-in.	4 21-in.		
Ex-Roumanian 3 in number	Galatz	1941 —43	224	19			585			1 4-in.	6 21-in.		
Ex-Finnish 5 in number	Abo	1930 —31											
Komissar	Leningrad	1916– 17	223	14½	12·6	2	650 790	2600 900	16 9	2 6-pr., 1 m.g.	4 18-in.	33	40
Kommunar	"	"	"	"	"	"	"	"	"	"	"	"	"
Tovarisnch	"	"	"	"	"	"	"	"	"	"	"	"	"
Krasnoarmeets	"	"	"	"	"	"	"	"	"	"	"	"	"
Krasnoflotets	"	"	"	"	"	"	"	"	"	"	"	"	"
Bednyak	"	"	"	"	"	"	"	"	"	"	"	"	"
Proletarii	"	"	"	"	"	"	"	"	"	"	"	"	"
Batrak	"	"	"	"	"	"	"	"	"	"	"	"	"
Rabochi	"	"	"	"	"	"	"	"	"	"	"	"	"
Aktivist	"	"	"	"	"	"	"	"	"	"	"	"	"
Politrak	"	"	"	"	"	"	"	"	"	"	"	"	"
Internationalist	"	"	"	"	"	"	"	"	"	"	"	"	"
Partizan	"	"	"	"	"	"	"	"	"	"	"	"	"
About 25 of other types		1930– 35								1 4-in.			
L55 (ex-British)	Vickers	1917	230	24	13	2	870 1139	2400 1600	17 10	1 4-in., 1 m.g.	6 21-in.	28	78
Lembit (ex-Estonian)	"	1937	190	24½	11	2	620 820	1200 700	13½ 8½	1 1·57-in., 20 mines.	4 21-in.	40	

A number of old Torpedo Boats are used as guard ships.

SPAIN.

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery and boilers	Where built	Date of launch	Date of completion	Cost	Armour		Armament		Speed	Fuel		Complement
											Side Deck	Gun position	Guns	Torpedo tubes		Coal	Oil	
cr.	Canarias	tons 10,000	ft. 636	ft. 64	ft. 17-4	90,000 P.T. (G.) Y.	Ferrol	1931	1934	£	in. 4 3	in. 1	8 8-in., 8 4-7-in. A.A., 8 2-pr. A.A., 2 sea-planes; 1 catapult.	12 21-in. (T.)	knots 33-0	tons — 2750	785	
cr.	Miguel de Cervantes	7475	579½	54	16½	80,000 P.T. (G.) Y.	Ferrol	1928 1925 1925	1930 1928 1927		3 1		8 6-in., 4 4-in. A.A., 2 3-pr., 1 M.	12 21-in. (T.)	33-0	— 1680	580	
cr.	*Navarra, ex-Repub-lica (ex-Reina Victoria Eugenia)	4857	462	50	15½	25,500 P.T.	Ferrol	1920	1923		3-1½ 1½	3	4 6-in., 4 3-5 A.A., 4 M., 1 L.		25-5	1200 230	404	
cr.	Méndez Núñez	4509	462	46	14½	45,000 (G.)	Ferrol	1922	1924		3 1		6 6-in., 4 7-9-in. A.A., 4 M.	6 21-in. (T.)	29	800 500	380	
g.b.	Dato	1000	251½	33½	11½	1700 (T)	Cartagena	1923	1925				4 4-in., 2 3-in. A.A., 2 M.		15	324	220	
g.b.	Canalejas	"	"	"	"	"	"	1922	1924						"	—	"	
g.b.	Canovas Del Castillo	"	"	"	"	"	"	1922	1923						"	—	"	
g.b.	Calvo Sotelo	1600	282	39½	10	5000 (T)	Cadiz	1924	1936				2 4-in., 2 3-in. A.A.		20	"	140	
g.b.	Herman Cortes	1710	312	42		5000 (D)		1944	Bldg.				1 M., 8 40-mm. A.A., 6 20-mm. A.A.		20		251	
g.b.	Pisarro	"	"	"	"	"		1944	1946				"		"			
g.b.	Vasco Núñez de Balboa	"	"	"	"	"		1944	Bldg.				"		"			
g.b.	Martin Alonso Pinson	"	"	"	"	"		1944	"				"		"			
g.b.	Magallanes	"	"	"	"	"		1945	"				"		"			
g.b.	Vincente Yanes Pinson	"	"	"	"	"		"	"				"		"			
g.b.	Sarmiento de Galbo	"	"	"	"	"		"	"				"		"			
g.b.	Legazpi	"	"	"	"	"		"	"				"		"			

* Training ship

SAILING TRAINING SHIPS.—Juan Sebastian de Elcano (1928), 3,500 tons, 800 H.P. (Diesel), 9-5 knots, 4 2-4-in.; Galatea (ex-Clamarella) (1903), 2,710 tons, 8½ knots, 4 2-24-in.

TRAINING SHIPS.—Virgen de La Caridad, Contramaestre Castellejo; Juan de Austria, 3,670 tons, 4 1-85-in.

OILER.—Pluton, 7,000 tons, 13 knots. Two building.

ARMED TRAWLERS.—Alcazar, Larache and Tetuan, 400 tons, 10 knots, 1 3-in. (also 2 3-pr in Alcazar); Arcilla, 510 tons, 10½ knots, 2 3-in.; Uad Martin, 420 tons, 10 knots, 1 3-in.;

Uad Quert, Xauen, 650 tons, 10½ knots, 1 3-in.

FISHERY PROTECTION VESSELS.—8 in number, 150 tons, 11 knots, 1 6-pr.

MINELAYERS.—Jupiter, Marte, Neptuno, Vulcano, 2,400 tons, 18½ knots, 4 4-7-in. A.A., 2 3-in., 4 1-6-in. A.A., 4 M.G., 261 mines, 2 depth charge release gears; Eolo, Triton, 1,500 tons

19 knots, 4 4-in., 4 1-5-in., 4 M.G., 100 mines.

TUGS.—R.R.12 (ex-Cartagenero), Ferrolano, R.R.14 (ex-Gadiano), 300 tons, 10 knots, 1 6-pr.; R.R.11 (ex-Galicia), 350 tons, 10 knots, 1 3-in.; R.A.1 (ex-Ciclope), 800 tons, 12 knots;

1 3-in. R.P. 21-27. Many more building.

MOTOR TROPIC BOATS.—Twenty in number. M.A.S. Boats.—Fourteen in number.

MINESWEEPERS.—Bidasoa, Guadalete, Lerez, Nervion, Segura, Tambre, Ter, 615 tons, 17 knots, 1 4-in., 2 3-7-in., 2 20-mm., and 5 more building.

Spain.

Name or number	Where built	Launched	Dimensions			Number of screws	Displacement	Horse-power	Maxi- mum trial speed	Armament	Torpedo tubes	Complement	Fuel	
			Length (extreme)	Beam	Draught								Coal	Oil
			Feet	Feet	Feet		Tons		Knots					Tons
DESTROYERS—														
Oquendo	Ferrol	Bldg.	382	36			1950	60,000	39	8 4-1-in. A.A., 12 40-mm.	6 21-in.			
Roger da Lauria	"	"	"	"	"		"	"	"	"	"			
Marques d' Fnsenada	"	"	"	"	"		"	"	"	"	"			
Blas de Lezo	"	"	"	"	"		"	"	"	"	"			
Gelmirez	"	"	"	"	"		"	"	"	"	"			
Langara	"	"	"	"	"		"	"	"	"	"			
Bonifaz	"	"	"	"	"		"	"	"	"	"			
Recalde	"	"	"	"	"		"	"	"	"	"			
Blasco de Garay	"	"	"	"	"		"	"	"	"	"			
Audaz	"	"	312	30½			1100	28,000	33	3 4-1-in., 4 40- mm.	6 21-in.			
Osado	"	"	"	"	"		"	"	"	"	"			
Atrevido	"	"	"	"	"		"	"	"	"	"			
Rayo	"	"	"	"	"		"	"	"	"	"			
Furor	"	"	"	"	"		"	"	"	"	"			
Ariete	"	"	"	"	"		"	"	"	"	"			
Temerario	"	"	"	"	"		"	"	"	"	"			
Intrepido	"	"	"	"	"		"	"	"	"	"			
Relampago	"	"	"	"	"		"	"	"	"	"			
Gravina	Cartagena	1931	333	31·7	10·5	2	1536	42,000	36	5 4-7-in., 1 3-in. A.A., 4 M.	6 21-in. (T.)	175	—	540
Escano	"	1932	"	"	"	"	"	"	"	"	"	"	"	"
Ciscar	"	1933	"	"	"	"	"	"	"	"	"	"	"	"
Jorge Juan	"	"	"	"	"	"	"	"	"	"	"	"	"	"
Ulloa	"	"	"	"	"	"	"	"	"	"	"	"	"	"
Almirante Valdés	"	1930	"	"	"	"	"	"	"	"	"	"	"	"
Almirante Ante- quera	"	"	"	"	"	"	"	"	"	"	"	"	"	"
Almirante Miranda	"	1931	"	"	"	"	"	"	"	"	"	"	"	"
Churrua	"	1929	"	"	"	"	"	"	"	"	"	"	"	"
Alcala Galiano	"	1930	"	"	"	"	"	"	"	4 4-7-in., 2 40- mm.	"	"	"	"
Lepanto	"	1928	"	"	"	"	"	"	"	"	"	"	"	"
José Luis Díez	"	"	"	"	"	"	"	"	"	"	"	"	"	"
Sanchez-Barcaizte- gul	"	1926	"	"	"	"	"	"	"	"	"	"	"	"
Alava	"	1946	"	"	"	"	"	"	"	"	"	"	"	"
Liniers	"	"	"	"	"	"	"	"	"	"	"	"	"	"
Juan Lazaga	"	1924	283	27	9	2	1044	33,000	34	3 4-in., 2 1-46- in. A.A.	4 21-in. (D.)	70	—	265
Valeseo	"	1923	"	"	"	"	"	"	"	"	"	"	"	"
Alsedo	"	1922	"	"	"	"	"	"	"	"	"	"	"	"
Ceuta	Naples	1920	310	31	10	2	1706	40,000	34	4 4-7-in., 2 3- in., 2 M.	4 17-7-in. (D.)	139	—	260
Melilla	"	"	"	"	"	"	"	"	"	"	"	"	"	"
TORPEDO BOATS—														
Huesca (<i>ex-Italian</i>)	Ansaldo	1915	268	26	8	2	850	20,000	32	2 4-in., 2 1-57- in. A.A., 2 M.	2 17-7-in. (D.)	99	—	250
Teruel (")	"	"	"	"	"	"	"	"	"	"	"	"	"	"
T 7, 14, 17	Cartagena	1913- 22	164	16·5	6½	3	187	3750	26	3 1-85-in. A.A.	3 18-in.	31	—	33
							Surf. Sub.		Surf. Sub.					
SUBMARINES—														
D1, 2, 3	"	1944 Bldg.	276	21·8	13	2	1050 1375	5000 1350	20·5 9·5	1 4-7-in., 4 M.	6 21-in.			
C 2	"	1928- 29	247	20·8	13·5	2	900 1270	2000 750	16 8·5	1 3-in. A.A.	6 21-in.	40	200	
Isaac Peral (<i>ex-C 1</i>)	"	"	"	"	"	"	"	"	"	"	"	"	"	"
B 2	"	1921- 24	210	18·9	11·25	2	560 830	1400 850	16 10·5	1 3-in. A.A.	4 18-in.	28	—	66
General Mola (<i>ex- Italian</i>)	Taranto	1934	231·5	22·5	13	2	880 1230	3000 1300	17 8·5	2 3-9-in., 2 M.G.	8 21-in.	48	150	
General Sanjurjo (<i>ex-Italian</i>)	"	"	"	"	"	"	"	"	"	"	"	"	"	"
G 1, 2, 3, 4, 5, 6	Cartagena	Bldg.					646			1 3-5-in., 1 20- mm.	5 21-in.			
G 7 (<i>ex-U 573</i>)	Hamburg	1942	220	20			784 883							

SWEDEN.

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery	Where built	Date of launch	Date of completion	Cost	Armour					Armament		Speed	Fuel		Com- ple- ment
											Belt	Deck	Side above belt	Bulk- head	Gun position	Guns	Secondary		Torpedo tubes	Guns		Torpedo tubes	Coal	Oil
l.c.r.	Tre Kronor Göta Lejon	tons 7500	ft. 591	ft. 54	ft. 5-4	100,000	Gotaverken Eriksberg	1944/1947 1945	1944/1947 1945	£	in.	in.	in.	in.	in.			7 6-in., 20 40-mm. 25 20-mm.			9 21-in.				knots 33	tons	590
l.c.r.	Fylgia	4200	378	48-6	20-6	12,444 Y. ‡	Stockholm	1905/1907	1905/1907	385,700	4 K.S.	2		5 K.S.	5 K.S.	8 5-9-in., 4 2-2-in., 4 7-5-in.	2 21-in.	22-7	900	328	
l.c.r.	Gotland †	4700	442	50-6	14-7	39,000 (G.)	Gothenburg	1933/1934	1933/1934	910,000 (estimated)						6 5-9-in., 4 3-in. A.A., 10 40-mm., 100 mines.	6 21-in.	27-0	oil	453	
c.d.s.	Drottning- Victoria *	7100	398-7	61	21½	22,000 (G.) Y.	Gothenburg	1917/1921	1917/1921	668,000	8-6 K.S.	1½	4 H.S.	8 K.S.	5 K.S.	4 7-1-in., 4 5-9-in., 4 3-in., 2 6-pr., 6 M.	— (T.)	23-0	680 98	540	
c.d.s.	Gustav V *	7100	398-7	61	21½	22,000 (G.) Y.	Malmö	1918/1922	1918/1922	668,000	8-6 K.S.	1½	4 H.S.	8 K.S.	5 K.S.	4 7-1-in., 6 5-9-in., 4 3-in. A.A., 2 6-pr., 6 M.	—	23-0	690 98	540	
c.d.s.	Manligsten	3361	287	49½	17-4	7400 Y.	Malmö	1903/1904	1903/1904		7 K.S.	1½		7½ K.S.	5 K.S.	2 8-3-in., 6 5-9-in., 8 6-pr., 1 7-pr.	2 sub. 18-in.	17-0	300	300	
c.d.s.	Oscar II *	4250	313-6	50-5	18	9000 Y.	Gothenburg	1906/1907	1906/1907	..	6 K.S.	2	6 K.S.	7½ K.S.	5 K.S.	2 8-3-in., 8 5-9-in., 8 6-pr., 1 7-pr.	2 sub. 18-in.	18-0	500	330	

* Reconstructed and modernised (1939).

† Reconstruction as A.A. ship from a hangar cruiser.

SWEDEN—continued.

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery	Where built	Date of launch	Date of completion	Cost	Armour						Armament		Speed	Fuel Com- ple- ment	
											Belt	Deck	Side above belt	Bulk- head	Gun position	Heavy guns	Secondary	Guns		Torpedo tubes	Coal	Oil
c.d.s.	<i>Sverige</i> *	tons 6899	ft. 392.7	ft. 61	ft. 21½	20,000 tur. Y.	Gothenburg	1915 1917	£ 660,000	in. 8-6 K.S.	in. 1½	in. 4 K.S.	in. ..	in. 8 K.S.	in. 5 K.S.				4 17-in., 6 5.9-in., 3-in., 2 6-pr., 6 M.				—	knots 22.5	tons 690 98	540
c.d.s.	<i>Tupperbeten</i>	3361	287	49½	17.7	6000 (R) Y.	Malmö	1901 1903	..	7 K.S.	1½	..	..	7½ K.S.	5 K.S.	2 8.3-in., 6 5.9-in., 10 6-pr., 1 7-pr.	2 sub. 21-in.	16.5	300 —	287
c.d.s.	<i>Aran</i>	"	"	"	"	"	Gothenburg	1901 1902	"	"	"	"	"	"	"	"	"	"	"	"	

* Reconstructed and modernised (1929-39).

MINELAYERS.—Aelvsnaabben, 3,750 tons, 4 6-in., 14 knots; Clas Fleming, 1,570 tons, 4 4.7-in., 4 M., 20 knots, 200 mines.
DEPOT SHIPS FOR SUBMARINES.—Patricia (1926), 3,000 tons, 14 knots; Dristigheten (1901), 3,218 tons, 16 knots, 4 3-in., 3 aircraft.
ICEBREAKERS.—Alie, 1,720 tons, 2 2.2-in.; Ymer, 3,450 tons, 18 knots, 4 3-in. Three building.
DEPOT SHIPS.—Jacob Bagge, Örnem, 738 tons, 20 knots, 2 4.7-in., 2 2.2-in.; Marielholm (1934), 1,116 tons, 12 knots, 1 1.57-in.
SAILING TRAINING SHIPS.—Al Chapman (1888), Jarramas (1900), 350 tons.

VEDETTE BOATS (used for minelaying and minesweeping).—Kaparen, Jagren, Snapphanen, Vaktaren, 290 tons, 24 knots, 2 3-in., 2 1-in. A.A.; Alkair, Argo, Astrea, Antares, Iris, Perseus, Polaris, Regulus, Rigel, Spica, Thetis (1908-11), 105 tons, 25 knots, 2 2.2-in., 1 18-in. r.r.; Castor, Pollux (1909), 105 tons, 20 knots, 2 1.5-in., 1 18-in. r.r.; No. 19 (1914), 55 tons, 10 knots; Nos. 27, 28, 30, 33, 34, 35, 36 (1900), 50 tons, 17 knots, 2 1.5-in., 1 15-in. r.r. Nos. 5-9 (1907), 50 tons, 11 knots, 1 1.5-in., 2 18-in. r.r.
TENDERS.—Sokaren, Sveparen, Sprangaren, 160 tons, 10 knots, 1 6-pr.

SALVAGE VESSEL.—Belos.
MOTOR TORPEDO BOATS.—Nos. 3 and 4, 55 ft., 25 tons, 2,200 H.P., 41 knots, 1 M., 2 18-in. r.r.; T 11, 12, 13, 14 (ex-Italian), 20 tons, 47 knots, 2 r.r.; T 15-18 (1911), 34 tons, 2 r.r., 18-in. T 19-22, 34 tons, several others.

MINESWEEPERS.—Starkodder, Styrbjörn, 350 tons, 15 knots, 2 1.5-in.; M. 1 and 2, 60 tons, 16½ knots, 2 M.G.; Bremön, Holmon, Grönstar, Koeter, Kullen, Ramskar, Sandon, Breckstar, Orskar, Ven, Vinga, Ulvon (1911), 17 knots, 2 4.3-in., 1 1-in. A.A.; Arholma, Landsort (1939), 365 tons, 17½ knots, 2 4-in.; M. 3-M. 14 (1939), 50 tons, 13 knots, 1 20-inn.; M. 18-M. 26 (1942), 60 tons, 13 knots, 1 20-inn.

SURVEYING VESSELS.—Gustaf Af Flint, Kompass, Johan Nordenanckar, Peter Gedda, Ejderen, Svensksund, Svalan.

OILERS.—Brinnaren (1933), 1,082 tons, 10 knots; Oljaren and Eldaren, 9 knots, 2 1-in.

HOSPITAL SHIP.—Prins Carl, 1,400 tons, 12 knots.

Sweden.

Name or number	Where built	Launched	Dimensions			Number of screws	Displacement	Horse-power	Maximum trial speed	Armament	Torpedo tubes	Complement	Fuel
			Length (extreme)	Beam	Draught								Coal Oil
DESTROYERS—													
Oland	Malmö	1945	Feet 340	Feet 36	Feet		Tons 1800	45,000	Knots 35	4 4·7-in., 40-mm.	6 21-in.		Tons
Uppland	Karlskrona	1946											
Sundsvall	Eriksberg	1943	320	29·5	9	2	1135	36,000	39	3 4·7-in., 6 40- mm.	6 21-in. (T)	140	
Kalmar	"	"	"	"	"	"	"	"	"	"	"	"	
Visby	Gotaverken	"	"	"	"	"	"	"	"	"	"	"	
Halsingborg	"	"	"	"	"	"	"	"	"	"	"	"	
Gävle	"	1940	304	29·5	12·5	2	1020	32,000	39	3 4·7-in., 4 1-in.	6 21-in.	131	150
Norrköping	"	"	"	"	"	"	"	"	"	"	"	"	
Karlskrona	Karlskrona	1939	"	"	"	"	"	"	"	"	"	"	
Stockholm	"	1936	"	"	"	"	"	"	"	"	"	"	
Malmö	Göteborg	1938	"	"	"	"	"	"	"	"	"	"	
Göteborg	"	1935	"	"	"	"	"	"	"	"	"	"	
Klas Horn	Malmö	1931	304·2	29·2	10·5	2	1000	24,000	35	3 4·7-in., 2 2- pr. A.A., 2 M.	6 21-in. (T)	125	150
Ehrensköld	Göteborg	1926	"	"	"	"	"	"	"	"	"	"	
Nordenskjöld	Malmö	"	"	"	"	"	"	"	"	"	"	"	
TORPEDO BOATS—													
Eight in number projected													
*Mode	Gothenburg	1942	243	26·4	9·5	2	635			3 4-in.	3 21-in.		
*Magne	"	"	"	"	"	"	"			"	"		
*Munin	"	"	"	"	"	"	"			"	"		
*Mjolner	"	"	"	"	"	"	"			"	"		
†Romulus (<i>ex-Spica</i>)	Naples	1934	263·6	26·9	7·4	2	638	19,000	34	3 3·9-in., 6 1·5- in. A.A.	4 17·7-in.		
†Remus (<i>ex-Astore</i>)	"	"	"	"	"	"	"	"	"	"	"		
†Puke (<i>ex-Ricasoli</i>)	"	1926	278·6	28·2	8·7	2	935	36,000	35	4 4·7-in., 2 1·5- in. A.A., 2 M., 40 mines.	4 21-in.	106	200
†Psilander (<i>ex-Nicotera</i>)	"	"	"	"	"	"	"	"	"	"	"		
*Wrangel	Gothenburg	1917	232·8	22	9·2	2	458	11,000	34·0	4 3-in., 2 M.	6 18-in.	72	107 6
*Wachtmeister	"	"	"	"	"	"	"	"	"	"	"	"	
*Ragnar	Malmö	1909	216	20·8	9	2	354	8000- 9000	30·0	4 3-in., 2 M.	2 18-in. (D.)	67	80 3
*Sigurd	Gothenburg	"	"	"	"	"	"	"	"	"	"	"	
*Vidar	Malmö	"	"	"	"	"	"	"	"	"	"	"	
*Hugin	Gothenburg	"	"	"	"	"	"	"	"	"	"	"	
ESCORT VESSELS—													
Granat	"	1925	121½	23	14		440		10	1 2·24-in.			
Harpun	"	"	"	"	"		Surf. 760		Surf. 15				
SUBMARINES—													
<i>1st Class—</i>													
Dykaren	Kockum	1941	204	20·5	11	2	530	2000	15	1 4-in., 2 M.	6 21-in.		
Sjoberren	"	"	"	"	"	"	760	—	10	"	"		
Sjohasten	"	"	"	"	"	"	"	"	"	"	"		
Sjoormen	"	"	"	"	"	"	"	"	"	"	"		
Svardfisen	"	"	"	"	"	"	"	"	"	"	"		
Tumlaran	"	"	"	"	"	"	"	"	"	"	"		
Sjolejonet	"	"	"	"	"	"	"	"	"	"	"		
Sjobjornen	"	1936	204	20½	11	2	620		15	1 4-in., 2 M.G.	4 21-in.	32	
Sjohunden	"	—42	"	"	"	"	—		10	"	"		
Nackan	"	"	"	"	"	"	"	"	"	"	"		
Najad	"	"	"	"	"	"	"	"	"	"	"		
Neptun	"	"	"	"	"	"	"	"	"	"	"		
Nordkaparen	"	1935	199	20½	11	2	500		15	1 4-in.	4 21-in.	28	
Delfinen	"	"	"	"	"	"	720		10	"	"		
Springaren	"	"	"	"	"	"	"	"	"	"	"		
Draken	Naval Yard, Karlskrona	1926	213	21	10·8		700	2800	16	1 4-in., 1 M.	4 20-in.	32	— 40
Gripen	"	1928	"	"	"		850	—	9	"	"	"	
*Valen	"	1925	186	23·2	9·4		492		15	1 3-in., 1 M.	4 18-in.	—	34
							650		9	"	"	"	
COASTAL SUBMARINES—													
U1, U2, U4-D	"	1941- 44	164	14			367			1 2·24-in., 1 M.	4 21-in.	25	
U3	Karlskrona	1942	"	"			"			"	"	"	

* Fitted for minelaying.

† *Ex-Italian.*

UNITED STATES.—BATTLESHIPS.

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery	Where built	Date of launch	Date of completion	Armour				Armament		Speed	Fuel Oil	Complement
										Belt	Deck	Side above belt	Bulk- head	Gun position	Guns	Torpedo tubes		
b.	Kentucky †	tons	ft.	ft.	ft.	200,000	Norfolk N.Y.	Blg.	£	in.	in.	in.	in.	in.	9 16-in. guns, 20 5-in., many smaller A.A. guns, 4 aircraft, 2 catapults.	—	knots	tons
b.	Iowa	45,000	86½	108	36	C.T.(G.)	New York N.Y.	1912 1943	25,000,000	in.	in.	in.	in.	in.	9 16-in. guns, 20 5-in., many smaller A.A. guns, 4 aircraft, 2 catapults.	—	30	2700
b.	New Jersey	"	"	"	"	"	Philadelphia N.Y.	1942 1943	"	in.	in.	in.	in.	in.	"	"	"	"
b.	Missouri	"	"	"	"	"	New York N.Y.	1944 1944	"	in.	in.	in.	in.	in.	"	"	"	"
b.	Wisconsin	"	"	"	"	"	Philadelphia N.Y.	1913 1944	"	in.	in.	in.	in.	in.	"	"	"	"
b.	Indiana	35,000	680	108	29½	115,000	Newport News N.Y.	1941 1942	17,500,000	in.	in.	in.	in.	in.	9 16-in. guns, 20 5-in., many smaller, 3 aircraft, 2 catapults.	—	27	2500
b.	Massachusetts	"	"	"	"	tur.	Bethlehem (S.B. Co.)	1941 1942	"	in.	in.	in.	in.	in.	(S. Dakota has 16 5-in. guns.)	"	"	"
b.	Alabama	"	"	"	"	"	Norfolk N.Y.	1942 1942	"	in.	in.	in.	in.	in.	"	"	"	"
b.	South Dakota	"	"	"	"	"	New York (S.B. Co.)	1941 1942	"	in.	in.	in.	in.	in.	"	"	"	"
b.	Washington	"	729	106	28	"	Philadelphia N.Y.	1940 1941	"	in.	in.	in.	in.	in.	"	"	"	"
b.	North Carolina	"	"	"	"	"	New York N.Y.	1940 1941	"	in.	in.	in.	in.	in.	"	"	"	"
b.	West Virginia *	31,800	624	97½	30	27,300	Newport News	1921 1923	1,383,000	13½-1 k.s.	18 k.s.	18 k.s.	18 k.s.	18 k.s.	8 16-in. (45 cal.), 16 5-in. (58 cal.), A.A., many small A.A., 2 catapults, 3 float-planes.	—	21-0	4570 2350
b.	Colorado *	32,000	624	97½	30½	27,300	New York (S.B. Co.)	1921 1923	1,383,000	13½-12 k.s.	18 k.s.	18 k.s.	18 k.s.	18 k.s.	8 16-in. (45 cal.), 12 5-in. (51 cal.), 8 5-in. (25 cal.) A.A., many small A.A., 2 catapults, 3 float-planes.	2 21-in. (sub.)	21-0	4570 2200

* Bulged: West Virginia was completely rebuilt at Puget Sound 1943-4.

† Kentucky and Hawaii are to have a main armament of rocket projectors and rockets.

UNITED STATES.—BATTLESHIPS—continued.

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery and boilers	Where built	Date of launch	Date of completion	Cost	Armour					Armament		Speed	Fuel Complement	
											Belt	Deck	Side above belt	Bulk-head	Gun position	Guns	Torpedo tubes			
b.	Maryland *	tons 31,500	ft. 624	ft. 97½	ft. 29½	27,300 B. & W. tur. (G.) and electric drive	Newport News	1920 1921	£ 1,383,000	in. 13½ -12 K.S.	in.	in.	in.	in. 18 K.S.	Heavy Guns	Secondary	8 16-in. (45 cal.), 10 5-in. (51 cal.), 8 5-in. (38 cal.) A.A., many small A.A., 2 catapults, 3 floatplanes.	—	knots 21	tons 4570 2100
b.	Tennessee †	32,300	624	97½	30½	34,800 B. & W. Tur. electric drive	New York (Navy Yard)	1919 1920	2,620,000	14-8 K.S.	3			18 K.S.			12 14-in. (50 cal.), 16 5-in. (38 cal.), many small A.A., 2 catapults, 3 floatplanes.	—	21·0	4656
b.	California ‡	32,600	624	97½	30½	26,800 tur. electric drive	Mare Island (Navy Yard)	1919 1921	2,620,000	14-8 K.S.	3			18 K.S.			12 14-in. (50 cal.), 16 5-in. (38 cal.), many small A.A., 2 catapults, 3 floatplanes.	—	21	4656 2200
b.	New Mexico §	33,400	624	106½	29½	32,000 T.(G.) drive	New York (Navy Yard)	1917 1918	1,485,000	14 K.S.	3			18 K.S.			12 14-in. (50 cal.), 6 5-in. (51 cal.), 8 5-in. A.A., 2 6-pr., many small A.A., 3 floatplanes.	—	21	3271 1930
b.	Mississippi §	33,000	624	106½	29½	32,000 B. & W. C.T. (G.)	Newport News	1917 1917	1,485,000	14 K.S.	3			18 K.S.			12 14-in. (50 cal.), 6 5-in. (51 cal.), 8 5-in. A.A., many small A.A., 2 catapults, 3 floatplanes.		21	3271 1930
b.	Idaho §	33,400	624	106½	29½	32,000 B. & W. P.T. (G.)	New York (S.B. Co.)	1917 1919	1,485,000	14 K.S.	3			18 K.S.			12 14-in. (50 cal.), 6 5-in. (51 cal.), 8 5-in. A.A., many small A.A., 2 catapults, 3 floatplanes.		21½	3271 1930

b. Pennsylvania ||	33,100	608	106½	28	40,000 B. & W. Cur. tur.	Newport News	1915-1916	1,485,000	14 K.S.	3	18 K.S.	—	21-0	2300-2290	12 74-in. (45 cal.), 16 5-in. (38 cal.), A.A., many small A.A., 2 catapults, 3 float- planes.
b. Nevada ¶	29,000	583	108	27½	25,000 Y. P. tur.	Quincy, Mass. (Fore River)	1914-1916	1,211,342	13½-81½-3 K.S.	13½-3 K.S.	18-16 K.S.	—	20-5	2000-2100	10 74-in. (45 cal.), 16 5-in. (38 cal.) A.A., many small A.A., 2 catapults, 3 float- planes.
b. New York **	27,000	573	106	26	28,100 B. & W. recip.	New York (Navy Yard)	1912-1914	1,315,114	12-4 K.S.	3	14-8 K.S.	—	21-0	5200-1530	10 74-in. (45 cal.), 6 5-in. (31 cal.), 8 3-in. (50 cal.) A.A., many small A.A., 1 cata- pult, 2 floatplanes.
b. Texas **	27,000	573	106	26	28,100 recip.	Newport News	1912-1914	1,166,000	12-4 K.S.	3	14-8 K.S.	—	21-0	5200-1530	10 74-in. (45 cal.), 6 5-in. (31 cal.), 8 3-in. (50 cal.) A.A., many small A.A., 1 cata- pult, 3 floatplanes.
b.c. Alaska b.c. Guam b.c. Hawaii ††	27,500 " " " "	808½ " " " "	89½ " " " "	89½ " " " "	150,000 B. & W. T.(G.)	New York (S.B. Co.) "	1943-1944 1943-1944 1945-46					30 " " " "		1500 " " " "	9 72-in. (50 cal.) 12 5-in. (38 cal.) 4 Aircraft 2 Catapults

* Bulged.

† Rebuilt at Bremerton 1942-43. Training battleship.

‡ California rebuilt 1942-43.

§ Rebuilt 1930-34; protection increased, bulges fitted, new turbines fitted (New Mexico originally had electric drive).

|| Modernised in 1931. Modernisation included fitting bulges, reboiling, increasing elevation of turret guns, replacing former anti-aircraft batteries by 5-inch A.A. guns, new masts and new fire control. Again overhauled in 1942.

¶ Modernised in 1929. Alterations include fitting of bulges, deck protection, tripod masts, increasing elevation of turret guns, fitting a new 5-in. anti-aircraft battery.

** Modernised in 1927. Modernisation included fitting of bulge protection, protection of decks against aerial attack, conversion to oil burning, and addition of catapults.

The sums given in the cost column are exclusive of the cost of armour and armament according to the system of making appropriations in the estimates.

†† See note on page 225.

Pennsylvania, Nevada, and New York used in atomic bomb tests at Bikini.

UNITED STATES.—AIRCRAFT CARRIERS.

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power, type of machinery and boilers	Where built	Date of launch	Date of completion	Cost		Armour		Armament		Speed	Fuel Oil	Complement
										£		Deck	Belt	Guns	Torpedo tubes			
		tons	ft.	ft.	ft.							in.	in.			knots	tons	
	Midway Class—																	
a.c.	Midway	45,000	968	113		200,000	Newport News	1945	1945					18 5-in. (54 cal.),		33		3000
a.c.	Franklin D. Roosevelt	"	"	"		"	New York N.Y.	1945	1945					—40-mm., operates approx. 100 aircraft.		"		"
a.c.	Coral Sea	"	"	"		"	Newport News	1946								"		"
	Essex Class—																	
a.c.	Essex	27,100	860	93		150,000 T.G.	Newport News	1942	1942					12 5-in. (38 cal.), operates approx. 80 aircraft.		32		2500
a.c.	Yorktown	"	"	"		"	"	1943	1943					"		"		"
a.c.	Intrepid	"	"	"		"	"	"	1944					"		"		"
a.c.	Franklin	"	"	"		"	"	"	1943					"		"		"
a.c.	Hornet	"	"	"		"	"	1944	1944					"		"		"
a.c.	Ticonderoga	"	"	"		"	"	"	"					"		"		"
a.c.	Randolph	"	"	"		"	"	"	1945					"		"		"
a.c.	Boxer	"	"	"		"	"	1945	1945					"		"		"
a.c.	Leyte	"	"	"		"	"	1945	1946					"		"		"
a.c.	Lexington	"	"	"		"	Bethlehem	1942	1943					"		"		"
a.c.	Bunker Hill	"	"	"		"	"	1943	"					"		"		"
a.c.	Wasp	"	"	"		"	"	1944	1944					"		"		"
a.c.	Hancock	"	"	"		"	"	1944	1944					"		"		"
a.c.	Bennington	"	"	"		"	New York N.Y.	1945	1946					"		"		"
a.c.	Kearsarge	"	"	"		"	"	1945	"					"		"		"
a.c.	Oriskany	"	"	"		"	"	1945	1945					"		"		"
a.c.	Bon Homme Richard	"	"	"		"	"	1944	1945					"		"		"
a.c.	Shangri-la	"	"	"		"	Norfolk N.Y.	1944	1944					"		"		"
a.c.	Tarawa	"	"	"		"	"	1945	1946					"		"		"
a.c.	Lake Champlain	"	"	"		"	"	1944	1945					"		"		"
a.c.	Antietam	"	"	"		"	Philadelphia N.Y.	1944	1945					"		"		"
a.c.	Princeton	"	"	"		"	"	1945	1945					"		"		"
a.c.	Valley Forge	"	"	"		"	"	1945	1946					"		"		"
a.c.	Philippine Sea	"	"	"		"	Bethlehem	1945	1946					"		"		"

Enterprise	19,800	800½	83½	21½	120,000 T. (G.) B. & W.	Newport News	1936	1938						
—														
Ranger	14,500	769	80	19½	53,500 T. (G.)	Newport News	1933	1931	4,000,000 app.	1		8 5-in., many light A.A., 80 aircraft, 1 catapult.	34	2200
Independence Class *—														
Independence †	11,000	610	71½		100,000 T.G.	New York S.B. Co.	1942	1943				Many 40-mm. and 20-mm. A.A. guns, approx. 45 aircraft.	32	1200
Bulfinch Wood	"	"	"		"	"	"	"				"	"	"
Corydon	"	"	"		"	"	1943	"				"	"	"
Montgomery	"	"	"		"	"	"	"				"	"	"
Cabot	"	"	"		"	"	"	"				"	"	"
Langley	"	"	"		"	"	"	"				"	"	"
Babian	"	"	"		"	"	"	"				"	"	"
San Jacinto	"	"	"		"	"	"	"				"	"	"
Seiwan Class—														
Seiwan	14,500	683½	77		120,000	New York	1945	1945				Many 40-mm. and 20-mm. guns.	30	800
Wright	"	"	"		"	S.B. Co.	"	1946				"	"	"
Cashabona Class—														
Cashabona	7,800	512	65		11,200 (R.)	Kaiser Co.	1943	1943				1 5-in. (38 cal.), operates approx. 21 aircraft, 1 cata- pult.	18	"
Ambo	"	"	"		"	"	"	"				"	"	"
Corregidor	"	"	"		"	"	"	"				"	"	"
Mission Bay	"	"	"		"	"	"	"				"	"	"
Grand Island	"	"	"		"	"	"	"				"	"	"
Martin Bay	"	"	"		"	"	"	"				"	"	"
Madonna Bay	"	"	"		"	"	"	"				"	"	"
Trigoli	"	"	"		"	"	"	"				"	"	"
Wake Island	"	"	"		"	"	"	"				"	"	"
White Plains	"	"	"		"	"	"	"				"	"	"
Solomon	"	"	"		"	"	"	"				"	"	"
Kalmit Bay	"	"	"		"	"	"	"				"	"	"
Kassan Bay	"	"	"		"	"	"	"				"	"	"
Fanshaw Bay	"	"	"		"	"	"	"				"	"	"
Kittun Bay	"	"	"		"	"	"	"				"	"	"
Tulagi	"	"	"		"	"	"	"				"	"	"
Naborna Bay	"	"	"		"	"	"	"				"	"	"
Hoggar Bay	"	"	"		"	"	"	"				"	"	"
Kabanhan Bay	"	"	"		"	"	"	"				"	"	"
Marcus Island	"	"	"		"	"	"	"				"	"	"

* Originally designed as cruisers.

† Badly damaged at Bitini Tests.

UNITED STATES.—AIRCRAFT CARRIERS—*continued.*

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery and boilers	Where built	Date of launch	Date of completion	Armour		Armament		Speed	Fuel Oil	Complement
										Deck	Belt	Guns	Torpedo tubes			
	Casablanca Class															
e.c.	(<i>contd.</i>)															
e.c.	Savo Island	7,800	512	65	ft.	11,200 (R.)	Kaiser Co.	1943	1944	in.	in.	1 5-in. (38 cal.), operates approx. 21 aircraft, 1 catapult.		18	tons	800
e.c.	Petrof Bay	"	"	"	"	"	"	1944	1944					"	"	"
e.c.	Rudyard Bay	"	"	"	"	"	"	"	"					"	"	"
e.c.	Saginaw Bay	"	"	"	"	"	"	"	"					"	"	"
e.c.	Sargent Bay	"	"	"	"	"	"	"	"					"	"	"
e.c.	Shamrock Bay	"	"	"	"	"	"	"	"					"	"	"
e.c.	Shimley Bay	"	"	"	"	"	"	"	"					"	"	"
e.c.	Sitkoh Bay	"	"	"	"	"	"	"	"					"	"	"
e.c.	Steamer Bay	"	"	"	"	"	"	"	"					"	"	"
e.c.	Cape Esperance	"	"	"	"	"	"	"	"					"	"	"
e.c.	Takanis Bay	"	"	"	"	"	"	"	"					"	"	"
e.c.	Thetis Bay	"	"	"	"	"	"	"	"					"	"	"
e.c.	Salamaus	"	"	"	"	"	"	"	"					"	"	"
e.c.	Makassar Strait	"	"	"	"	"	"	"	"					"	"	"
e.c.	Windham Bay	"	"	"	"	"	"	"	"					"	"	"
e.c.	Makin Island	"	"	"	"	"	"	"	"					"	"	"
e.c.	Lunga Point	"	"	"	"	"	"	"	"					"	"	"
e.c.	Hollandia	"	"	"	"	"	"	"	"					"	"	"
e.c.	Kwajalein	"	"	"	"	"	"	"	"					"	"	"
e.c.	Admiralty Islands	"	"	"	"	"	"	"	"					"	"	"
e.c.	Bougainville	"	"	"	"	"	"	"	"					"	"	"
e.c.	Matanikau	"	"	"	"	"	"	"	"					"	"	"
e.c.	Attu	"	"	"	"	"	"	"	"					"	"	"
e.c.	Roi	"	"	"	"	"	"	"	"					"	"	"
e.c.	Munda	"	"	"	"	"	"	"	"					"	"	"
	—															
	Commencement Bay Class															
e.c.	Commencement Bay	12,000	553	75		16,000	Todd, Tacoma	1944	1944			2 5-in. (38 cal.), operates approx. 21 aircraft.		18		1000
e.c.	Block Island	"	"	"	"	"	"	"	"					"		"
e.c.	Gilbert Islands	"	"	"	"	"	"	"	"					"		"

UNITED STATES.—CRUISERS.

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power, type of machinery and boilers	Where built	Date of launch	Date of completion	Cost (exclusive of armament)	Armour		Armament		Speed	Fuel Oil	Complement
											Belt Deck	Gun position	Guns	Torpedo tubes			
Des Moines Class	Des Moines	tons 17,000	ft. 716½	ft. 75½	ft.	120,000		Bldg.		£	in.	in.	9 8-in. (50 cal.), 12 5-in. (38 cal.), many smaller.		knots 30		
	Salem	" "	" "	" "	"	"		"									
	Dallas	" "	" "	" "	"	"		"									
	Newport News	" "	" "	" "	"	"		"									
Modified Baltimore Class	Oregon City	13,700	673½	69½	"	120,000	Bethlehem	1945	1946				9 8-in. (50 cal.), 12 5-in. (38 cal.), many smaller.		30		
	Albany	" "	" "	" "	"	"	"	"	"								
	Rochester	" "	" "	" "	"	"	"	"	"								
	Baltimore	13,600	673½	69½		120,000	Bethlehem (Quincy)	1942	1943				9 8-in. (50 cal.), 12 5-in. (38 cal.), many light A.A., 4 aircraft, 2 catapults.		30		1500
Wichita Class	Boston	" "	" "	" "		"	"	1943	"						"	"	"
	Camberra	" "	" "	" "		"	"	1944	"						"	"	"
	Quincy	" "	" "	" "		"	"	"	"						"	"	"
	Pittsburgh	" "	" "	" "		"	"	1944	"						"	"	"
	Saint Paul	" "	" "	" "		"	"	"	"						"	"	"
	Columbus	" "	" "	" "		"	"	"	"						"	"	"
	Helena	" "	" "	" "		"	"	"	"						"	"	"
	Bremerton	" "	" "	" "		"	"	1945	"						"	"	"
	Fall River	" "	" "	" "		"	New York S.B. Co.	1944	1945						"	"	"
	Macon	" "	" "	" "		"	"	"	"						"	"	"
	Toledo	" "	" "	" "		"	"	1945	"						"	"	"
	Los Angeles	" "	" "	" "		"	Philadelphia	1944	1945						"	"	"
	Chicago	" "	" "	" "		"	N.Y.	"	"						"	"	"
	Wichita	10,000	614	61½	19½	100,000 (U.)	Philadelphia Navy Yard	1937	1939				9 8-in., 8 5-in. A.A., many small A.A., 2 catapults, 4 aircraft.	None	32½	1650	1200

New Orleans Class	Tuscaloosa	9975	588	61½	194	107,000 W.G.T. (Tuscaloosa)	New York S.B. Co.	1933	1934	2,080,000 estimated		32.7	1850	1200	9 8-in. (55 cal.), 8 5-in. (25 cal.) A.A., many small A.A., 2 catapults, 4 sea-planes, 50 mines.
	San Francisco	9950	"	"	"	"	Mare Island Navy Yard	1933	1934			"	"	"	"
	New Orleans	9950	"	"	"	P.T.(G.)	New York Navy Yard	1933	1934	2,480,000		"	"	"	"
	Minneapolis	9950	"	"	"	"	Philadelphia Navy Yard	1933	1934	2,480,000		"	"	"	"
Portland Class	Portland	9800	610½	66	17½	107,000 P.T.(G.)	Bethlehem S.B. Co. Quincy	1932	1933	2,210,000	$\frac{4}{2}$	32.7	"	"	9 8-in. (55 cal.), 8 5-in. (25 cal.) A.A., many small A.A., 3 catapults, 4-8 aircraft.
Chester Class	Chester	9200	600½	66	16½	107,000 P.T.(G.)	New York, S.B. Co.	1929	1930	2,230,000	$\frac{3}{2}$	32½	1500	1200	9 8-in. (55 cal.), 8 5-in. (25 cal.) A.A., many small A.A., 2 catapults, 4-6 sea-planes.
	Louisville	9050	"	"	"	"	Puget Sound Navy Yard	1930	1931	2,230,000	$\frac{3}{2}$	"	"	"	"
	Augusta	9050	"	66	"	"	Newport News S.B. Co.	1930	1931	2,170,000	$\frac{3}{2}$	"	"	"	"
Worcester Class	Worcester	14,700	"	"	"	"	New York, S.B. Co.	Bldg.	"			"	"	"	12 6-in., 24 3-in.
	Roanoke	"	"	"	"	"	"	"	"			"	"	"	12 6-in., 12 5-in., many smaller.
Modified Cleveland Class	Fargo	10,000	608½	63	"	100,000 (G.)	"	1945	1946			"	"	"	"
	Huntingdon	"	"	"	"	"	"	"	"			"	"	"	"
Cleveland Class	Cleveland	10,000	608½	63	"	100,000 (G.)	New York S.B. Co. (Camden)	1941	1942			33	1200	1200	12 6-in. (47 cal.), 12 5-in. (38 cal.), many small A.A., 4 aircraft.
	Columbia	"	"	"	"	"	"	"	"			"	"	"	"
	Montpelier	"	"	"	"	"	"	"	"			"	"	"	"
	Denver	"	"	"	"	"	"	"	"			"	"	"	"
	Santa Fe	"	"	"	"	"	"	"	"			"	"	"	"
	Birmingham	"	"	"	"	"	Newport News	"	1943			"	"	"	"
	Mobile	"	"	"	"	"	"	"	"			"	"	"	"
	Vincennes	"	"	"	"	"	Bethlehem (Quincy)	1943	1944			"	"	"	"
	Passadena	"	"	"	"	"	"	"	"			"	"	"	"
	Springfield	"	"	"	"	"	"	"	"			"	"	"	"
	Topeka	"	"	"	"	"	"	"	"			"	"	"	"
	Elkhart	"	"	"	"	"	"	"	"			"	"	"	"
	Houston	"	"	"	"	"	Newport News	1943	1943			"	"	"	"
	Providence	"	"	"	"	"	Bethlehem (Quincy)	"	1944	"	"	"	"	"	"
		"	"	"	"	"	"	"	1945			"	"	"	"

UNITED STATES.—CRUISERS—*continued.*

Class	NAME	Standard displacement	Length (extreme)	Beam	Draught	Horse-power. Type of machinery and boilers	Where built	Date of launch	Date of completion	Cost (exclusive of armament)	Armour		Armament		Speed	Fuel Oil	Complement
											Belt	Deck	Guns	Torpedo tubes			
Cleveland Class— <i>concl.</i>	Manchester	tons 10,000	ft. 608½	ft. 63	ft.	100,000 (G.)	Bethlehem (Quincy)	1945	1946	£	in.	in.	12 6-in. (47 cal.), 12 5-in. (38 cal.), many small A.A., 4 aircraft.		knots 33	tons	1200
	Vicksburg	"	"	"	"	"	Newport News	1943	1944						"	"	"
	Duluth	"	"	"	"	"	"	1944	"						"	"	"
	Miami	"	"	"	"	"	Cramp	1942	1943						"	"	"
	Astoria	"	"	"	"	"	S.B. Co.	1943	1944						"	"	"
	Oklahoma City	"	"	"	"	"	"	1944	"						"	"	"
	Little Rock	"	"	"	"	"	"	"	1945						"	"	"
	Galveston	"	"	"	"	"	"	1945	1946						"	"	"
	Amsterdam	"	"	"	"	"	Newport News	1944	1945						"	"	"
	Portsmouth	"	"	"	"	"	"	"	"						"	"	"
	Wilkes-Barre	"	"	"	"	"	New York	1943	1944						"	"	"
	Atlanta	"	"	"	"	"	S.B. Co.	1944	"						"	"	"
Brooklyn Class	Dayton	"	"	"	"	"	(Camden)	"	1945						"	"	"
	Savannah	9,700	"	61½	19½	"	N.Y.S. Co., Camden	1937	1938	2,410,000 estimated	5	3	15 6-in., 8 5-in. A.A., many small A.A., 4 seaplanes, 2 catapults.		32½	2100	"
	Nashville	"	"	"	"	"	N.Y.S. Co., Camden	1937	1938		"	"			"	"	"
	Brooklyn	"	"	"	"	"	New York	1937	1938		"	"			"	"	"
	Philadelphia	"	"	"	"	"	Navy Yard Philadelphia	1937	1938		"	"			"	"	"
	Phoenix	"	"	"	"	"	N.Y.S. Co., Camden	1938	1938	2,395,000	"	"			"	"	"
	Boise	"	"	"	"	"	Newport	1936	1938	2,330,000	"	"			"	"	"
	Honolulu	"	"	"	"	"	News, New York	1937	1938		"	"			"	"	"
	St. Louis	"	"	"	"	"	Navy Yard Newport	1938	1938		"	"			"	"	"
	—	"	"	"	"	"	News	1938	1938		"	"			"	"	"
	—	"	"	"	"	"	News	1938	1938		"	"			"	"	"

San Diego Class	Spokane	6000	541	52½	16½	75,000	Kearny	1945	1947		33		700
	Fresno	"	"	"	"	"	"	1941	"		33		
	San Diego	"	"	"	"	"	Bethlehem (Quincy)	"	"				
	San Juan	"	"	"	"	"	"	"	"				
	—												
Oakland Class	Oakland	6000	541	52½	16½	75,000	Bethlehem (San Francisco)	1942	1943		33		
	Reno	"	"	"	"	"	"	"	"				
	Flint	"	"	"	"	"	"	1944	1944				
	Tucson	"	"	"	"	"	"	1944	1945				
	Juneau	"	"	"	"	"	Federal,	1945	1946				
	—												
Pensacola * Class	Salt Lake City	9100	585½	65½	16	107,000 P.T.(G.)	New York S.B. Co.	1929	1929	3	32.7	3000	1200
	Pensacola	"	"	"	"	"	Navy Yard, New York	1929	1930	1½	"	"	"

* Both ships badly damaged in "Operation Crossroads" and probably written off.

United States—continued.

Name or number	Where built	Completed	Dimensions			Number of screws	Standard displacement	Horse-power	Maximum speed	Armament	Torpedo tubes	Complement	Fuel Oil											
			Length (extreme)	Beam	Draught																			
DESTROYERS—contd. <i>Gearing Class—contd.</i>			Feet	Feet	Feet		Tons		Knots				Tons											
Bethlehem, Staten Island	1945	399½	40½	2	2,400	60,000	35	6 5-in. (38 cal.) 12 or 16 40-mm. A.A.	5 or 10 21-in.	350														
Vogelsgegang	"																							
Steinaker	"																							
Harold Ellison	"																							
Charles R. Ware	"																							
Cone	"																							
Stribling	"																							
Brownson	"																							
Arnold J. Isbell	"																							
Fechter	"																							
Damato	1946																							
Forrest Royal	Consolidated Steel, Orange												1945											
Hawkins																								
Duncan																								
Henry W. Tucker																								
Rogers																								
Perkins																								
Vesole																								
Leary																								
Dyess																								
Bordelon																								
Furse																								
Newman K. Perry																								
Floyd B. Parks																								
John R. Craig																								
Orleck																								
Brinckley Bass																								
Stickell																								
O'Hare																								
Meredith																								
Henley	Bethlehem, San Francisco	1946																						
<i>Sumner Class (Short Hull):</i>																								
Allen M. Sumner	Federal, Kearny	1944	376½	40½	2	2,200	60,000	35	6 5-in. (38 cal.) 12 or 16 40-mm. A.A.	5 or 10 21-in.	350													
Moale	"																							
Ingraham	"																							
English	"																							
Chas. S. Sperry	"																							
Ault	"																							
Waldron	"																							
Haynsworth	"																							
John W. Weeks	"																							
Hank	"																							
Wallace L. Lind	"																							
Borie	"																							
Compton	"																							
Gainard	"																							
Soley	"																							
Harland R. Dickson	"																							
Hugh Purvis	"																							
Barton	Bath Ironworks	1943																						
Walke	1944																							
Laffey	"																							
O'Brien	"																							
De Haven	"																							
Mansfield	"																							
Lyman K. Swenson	"																							
Collett	"																							
Maddox	"																							
Hyman	"																							
Purdy	"																							
*Robert H. Smith	"																							
*Thomas E. Fraser	"																							
*Shannon	"																							
*Harry F. Bauer	"																							
*Adams	"																							
*Tolman	"																							
Blue	Bethlehem, Staten Island	"																						
Brush	"																							
Taussig	"																							
Samuel N. Moore	"																							
Harry E. Hubbard	"																							
*Henry A. Wiley	"																							

* Completed as minelayers

United States—continued.

Name or number	Where built	Completed	Dimensions			Number of screws	Standard Displacement	Horse-power	Maximum speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
DESTROYERS—contd.			Feet	Feet	Feet		Tons		Knots				Tons
<i>Sumner Class—contd.</i>													
*Shea		1944	376½	40½		2	2,200	60,000	35	6 5-in. (38 cal.) 12 or 16 40-mm. A.A.	5 or 10 21-in.	350	
*J. Wm. Ditter		"											
A. A. Cunningham		"											
John R. Pierce		"											
Frank E. Evans		1945	376½	40½		2	2,200	60,000	35	6 5-in. (38 cal.) 12 or 16 40-mm. A.A.	5 or 10 21-in.	350	
John A. Bole		"											
Beatty		"											
Putnam		"											
Strong	Bethlehem, San Francisco	1944	376½	40½		2	2,200	60,000	35	6 5-in. (38 cal.) 12 or 16 40-mm. A.A.	5 or 10 21-in.	350	
Lofberg		1945											
John W. Thomason		"											
Buck		"											
Henley		"	376½	40½		2	2,400	60,000	35	6 5-in. (38 cal.) 12 or 16 40-mm. A.A.	10 21-in.	350	
Lowry	Bethlehem, San Pedro	1944											
*Lindsey		"											
*Gwin		"											
*Aaron Ward		"	376½	40½		2	2,400	60,000	35	6 5-in. (38 cal.) 12 or 16 40-mm. A.A.	10 21-in.	350	
Hugh W. Hadley		"											
William Keith		"											
James C. Owens		1945											
Zellers	Todd-Pacific, Seattle	1944	376½	40½		2	2,400	60,000	35	6 5-in. (38 cal.) 12 or 16 40-mm. A.A.	10 21-in.	350	
Massey		"											
Douglas H. Fox		1945											
Stormes		"											
R. K. Huntingdon	Bethlehem, San Pedro	"	376½	40½		2	2,400	60,000	35	6 5-in. (38 cal.) 12 or 16 40-mm. A.A.	10 21-in.	350	
Bristol		"											
		"											
		"											
<i>Fletcher Class :</i>													
Fletcher	Federal	1942	376	39½		2	2,050	60,000	35	5 5-in. (38 cal.) 40 mm. A.A.	10 21-in.	300	
Radford		"											
Jenkins		"											
La Vallette		"											
Nicholas	Bath	"	376	39½		2	2,050	60,000	35	5 5-in. (38 cal.) 40 mm. A.A.	10 21-in.	300	
O'Bannon	Ironworks	"											
Saufley	Federal	"											
Waller		"											
Taylor	Bath	"	376	39½		2	2,050	60,000	35	5 5-in. (38 cal.) 40 mm. A.A.	10 21-in.	300	
Bache	Ironworks	"											
Beale	Bethlehem	"											
Beale	Staten Island	"											
Guest	Boston	1943	376	39½		2	2,050	60,000	35	5 5-in. (38 cal.) 40 mm. A.A.	10 21-in.	300	
Bennett	Navy Yard	"											
Fullam		"											
Hudson		"											
Stanly	Charleston,	1942	376	39½		2	2,050	60,000	35	5 5-in. (38 cal.) 40 mm. A.A.	10 21-in.	300	
Stevens	N.Y.	1943											
Halford	Puget Sound,	"											
	N.Y.	"											
Philip	Federal	1942	376	39½		2	2,050	60,000	35	5 5-in. (38 cal.) 40 mm. A.A.	10 21-in.	300	
Renshaw		"											
Ringold		"											
Schroeder		1943											
Sigsbee		"	376	39½		2	2,050	60,000	35	5 5-in. (38 cal.) 40 mm. A.A.	10 21-in.	300	
Conway	Bath	1942											
Cony	Ironworks	"											
Converse		"											
Eaton		"	376	39½		2	2,050	60,000	35	5 5-in. (38 cal.) 40 mm. A.A.	10 21-in.	300	
Foote		"											
Terry		1943											
Anthony		"											
Wadsworth		"	376	39½		2	2,050	60,000	35	5 5-in. (38 cal.) 40 mm. A.A.	10 21-in.	300	
Walker		"											
Daly	Bethlehem,	"											
Isherwood	Staten Island	"											
Kimberley		"	376	39½		2	2,050	60,000	35	5 5-in. (38 cal.) 40 mm. A.A.	10 21-in.	300	
Ammen	Bethlehem,	"											
Mullany	San Francisco	"											
Trathen		"											
Hazelwood		"	376	39½		2	2,050	60,000	35	5 5-in. (38 cal.) 40 mm. A.A.	10 21-in.	300	
Heerman		"											
McCord		"											
Miller		"											
Owen		"	376	39½		2	2,050	60,000	35	5 5-in. (38 cal.) 40 mm. A.A.	10 21-in.	300	
The Sullivans		"											
		"											
		"											

- Completed as minelayers.

United States—continued.

Name or number	Where built	Completed	Dimensions			Number of screws	Standard Displacement	Horse-power	Maximum speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
DESTROYERS—contd.			Feet	Feet	Feet		Tons		Knots				Tons
<i>Fletcher Class—contd.</i>													
Stephen Potter		1943											
Tingey		"											
Twining		"											
Yarnall		"											
Boyd	Bethlehem,	1943											
Bradford	San Pedro	"											
Brown		"											
Cowell		"											
Capps	Gulf S.B. Co.	"											
David W. Taylor		"											
John D. Henley		1944											
Franks	Seattle-	1943											
Halley	Tacoma	"											
Laws		"											
Pritchett		1944											
Robinson		"											
Ross		"											
Rowe		"											
Smalley		"											
Stoddard		"											
Watts		"											
Wren		"											
Aulick	Consolidated	1942											
Charles Ausburn	Steel, Orange	"											
Claxton		"											
Dyson		"											
Harrison		1943											
John Rodgers		"											
McKee		"											
Murray		"											
Sproston		"											
Wickes		"											
Young		"											
Charette	Boston Navy	"											
Conner	Yard	"											
Hall		"											
Haraden		"	376	39½		2	2,050	60,000	35	5 5-in. (38 cal.)	10 21-in.	300	
Bell	Charleston	"								40-mm. A.A.			
Burns	Navy Yard	"											
Izard		"											
Paul Hamilton		"											
Howorth	Puget Sound	1944											
Killen	Navy Yard	"											
Hart		"											
Metcalfe		"											
Shields		1945											
Wiley		"											
Abbot	Bath	1943											
Braine	Ironworks	"											
Erben		"											
Hale		"											
Sigourney		"											
Stembel		"											
Albert W. Grant	Charleston,	"											
	N. Y.	"											
Caperton	Bath	"											
Cogswell	Ironworks	"											
Ingersoll		"											
Knapp		"											
Bearss	Gulf S.B. Co.	1944											
John Hood		"											
Van Valkenburgh		"											
Charles J. Badger	Bethlehem,	1943											
Colahan	Staten Island	"											
Dashiell	Federal	"											
Bullard		"											
Kidd		"											
Bennion	Boston, N. Y.	"											
Heywood L. Edwards		1944											
Richard P. Leary		"											
Bryant	Charleston,	1943											
	N. Y.	"											
Black	Federal	"											
Chauncey		"											
C. K. Bronson		"											

United States—continued.

Name or number	Where built	Completed	Dimensions			Number of screws	Standard Displacement	Horse-power	Maximum speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
DESTROYERS—contd.			Feet	Feet	Feet		Tons		Knots				Tons
<i>Fletcher Class—contd.</i>													
Cotten	Federal	1943	376	39½	2	2,050	60,000	35	5 5-in. (38 cal.) 40-mm. A.A.	10 21-in.	300		
Dortch		"											
Gatling		"											
Healy		"											
Hickox		"											
Hunt		"											
Lewis Hancock		"											
Marshall		"											
McDermut		"											
McGowan		"											
McNair		"											
Melvin		"											
Hopewell	Bethlehem,	"											
Porterfield	San Pedro	"											
Stockham	Bethlehem,	1944											
Wedderburn	San Francisco	"											
Picking	Bethlehem,	1943											
Halsey Powell	Staten Island	"											
Uhlmann	"	"											
Remy	Bath	"											
Wadleigh	Ironworks	"											
Norman Scott	"	"											
Mertz	"	"											
Cassin Young	Bethlehem,	1944											
Irwin	San Pedro	"											
Preston	"	"											
Benham	Bethlehem,	1943											
Cushing	Staten Island	1944											
Monssen	"	"											
Jarvis	Seattle-	"											
Porter	Tacoma	"											
Gregory	"	"											
Rooks	"	"											
<i>Somers Class—</i>													
Somers	Federal	1938	381	36½	10½	2	1,850	52,000	35	5 5-in., several 40-mm.	8 21-in. (Q)	300	
<i>Selfridge Class—</i>													
McDougall	New York	1936	381	36½	10½	2	1,850	50,000	35	5 5-in., 8 40- mm.	8 21-in. (Q)	300	
Phelps	Bethlehem	"											
Winslow	New York	1937											
<i>Bristol Class—</i>													
Bailey	Bethlehem	1942	348½	36	10	2	1,630	50,000	35½	4 5-in., several 40-mm.	5 21-in.	250	
Baldwin	Seattle	1943											
Bancroft	Bethlehem	1942											
Boyle	Bethlehem	"											
Buchanan	Federal	"											
Caldwell	Bethlehem	"											
*Carmick	Seattle	"											
Champlin	Bethlehem	"											
Coghlan	Bethlehem	"											
*Cowie	Boston	"											
*Davison	Federal	"											
*Doran	Boston	"											
*Doyle	Seattle	1943											
*Earle	Boston	1942											
Edwards	Federal	"											
*Ellyson	Federal	"											
*Endicott	Seattle	"											
Farenholt	Bethlehem	"											
*Fitch	Boston	"											
Frankford	Seattle	1943											
Frazier	Bethlehem	1942											
Gansevoort	Bethlehem	"											
*Gherardi	Philadelphia	"											
Gillespie	Bethlehem	1942											
*Hambleton	Federal	1941											
Herndon	Norfolk	"											
Hobby	Bethlehem	1942											
*Hobson	Charleston	"											
*Jeffers	Federal	"											
Kalk	Bethlehem	"											

* Employed as minesweepers

United States—continued.

Name or number	Where built	Completed	Dimensions			Number of screws	Standard Displacement	Horse-power	Maximum speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
DESTROYERS—contd. <i>Bristol Class—contd.</i>			Feet	Feet	Feet		Tons		Knots				Tons
Kendrick	Bethlehem	1942	348½	36	10	2	1,630	50,000	35½	4 5-in., several 40-mm. * Ellyson class minesweepers 3 5-in., 8 40-mm.	5 21-in.	250	
* Knight	Boston	"											
Lansdowne	Federal	"											
Lardner	Federal	"											
Laub	Bethlehem	"											
* Macomb	Bath	"											
MacKenzie	Bethlehem	"											
McCalla	Federal	"											
* McCook	Seattle	"											
McLanahan	Seattle	1943											
Meade	Bethlehem	1942											
* Mervine	Federal	"											
Murphy	Bethlehem	"											
Nelson	Federal	"											
Nields	Bethlehem	1943											
Ordronaux	Bethlehem	"											
Parker	Bethlehem	1942											
* Quick	Federal	"											
* Rodman	Federal	"											
Satterlee	Seattle	1943											
Shubrick	Norfolk	"											
Stevenson	Federal	"											
Stockton	Federal	"											
* Thompson	Seattle	"											
Thorn	Federal	"											
Tillman	Charleston	1942											
Welles	Seattle	1943											
Woodworth	Bethlehem	1942											
<i>Benson Class—</i>													
Benson	Bethlehem	1940											
Charles F. Hughes	Puget	"											
Eberle	Bath	"											
Edison	Federal	1941											
Ericson	Boston	"											
Gleaves	Bath	1940											
Grayson	Charleston	1941											
Hilary F. Jones	Charleston	1940											
Kearny	Federal	"											
Livermore	Bath	"											
Ludlow	Boston	1941											
Madison	Boston	1940											
Mayo	Bethlehem	"											
Niblack	Bath	"											
Nicholson	Charleston	1941											
Plunkett	Federal	1940											
Swanson	Charleston	1941											
Wilkes	Boston	"											
Woolsey	Bath	"											
<i>Anderson Class—</i>			348	35½	10	2	1,570	50,000	36	4 5-in., several 40-mm.	8 21-in. (Q)	250	
Mustin	Federal	1939											
Wainwright	Norfolk	1940											
<i>McCall Class—</i>			341½	34½	9½	2	1,500	50,000	36	4 5-in., several 40-mm.	8 21-in. (Q)	250	
Mayrant	Boston	1939											
Rhind	Philadelphia												
Stack	Norfolk												
Tripp	Boston												
Wilson	Puget												
<i>Bagley (ex-Craven Class)—</i>			341½	34½	9½	2	1500	50,000	36	4 5-in., several smaller A.A.	16 21-in. (Q)	250	
Bagley	Norfolk	1938											
Helm	Norfolk												
Mugford	Boston												
Ralph Talbot	Boston												
<i>Fanning Class—</i>			341½	34½	9½	2	1500	50,000	36	4 5-in., several 40-mm.	12 21-in. (Q)	250	
Dunlap	Bethlehem	1936											
Fanning	Staten I	1938											

* Employed as minesweepers.

United States—continued.

Name or number	Where built	Completed	Dimensions			Number of screws	Standard Displacement	Horse-power	Maximum speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
DESTROYERS—contd.			Feet	Feet	Feet		Tons		Knots				Tons
<i>Cummings (ex-Mahan Class—</i>													
Case	Boston	1937	341½	34½	9½	2	1500	50,000	36	45-in., several 40-mm.	12 21-in. (Q)	250	
Cassin	Philadelphia	"											
Conyngham	Staten I	"											
Cummings	Staten I	1936											
Downes	Boston	1937											
Flusser	Federal	1936											
Smith	Mare I	"											
SUBMARINES—													
† <i>Balao Class—</i>													
Balao	Portsmouth, N.Y.	1943	311½	27		2	Surf. 1525 Sub. 2400	6,500	Surf. 21 Sub. 21	2 5-in., some smaller.	10 21-in.	60	
Bullfish	"	"											
Bowfin	"	"											
Cabrilla	"	"											
Crevalle	"	"											
Devilfish	Cramp	1944											
Dragonet	"	"											
Hackleback	"	"											
Lancetfish	"	Bldg.											
Ling	"	1945											
Lionfish	"	1944											
Manta	"	1945											
Moray	"	"											
Roncador	"	"											
Sabalo	"	"											
Sablefish	"	"											
Seahorse	Mare Island, N.Y.	1943											
Skate *	"	"											
Tilefish	"	"											
Apogon *	Portsmouth, N.Y.	1943											
Aspro	"	"											
Batfish	"	"											
Archer Fish	"	"											
Burrfish	"	"											
Perch	Electric Boat Co.	1944											
Sealion	"	"											
Barbero	"	"											
Baya	"	"											
Becuna	"	"											
Bergall	"	"											
Besugo	"	"											
Blackfin	"	"											
Calman	"	"											
Blenny	"	"											
Blower	"	"											
Blueback	"	"											
Boarfish	"	"											
Charr	"	"											
Chub	"	"											
Brill	"	"											
Bugara	"	"											
Bumper	"	"											
Cabezon	"	"											
Dentuda *	"	"											
Captaine	"	"											
Carbonero	"	"											
Carp	"	"											
Catfish	"	"											
Entemedor	"	"											
Chivo	"	"											
Chopper	"	"											
Clamagore	"	"											
Cobbler	"	"											
Cochino	"	1945											
Corporal	"	"											
Cubera	"	"											
Cusk	"	1946											
Diodon	Cramp	"											
Dogfish	"	"											
Greenfish	"	"											
Halfbeak	"	"											
Guavina	Manitowoc	1944											
Guitarro	"	"											

* These boats were used in atomic tests at Bikini.

† Over eighty of these boats are to be fitted with "Schnorkel".

United States—continued.

Name or number	Where built	Completed	Dimensions			Number of screws	Displacement Surf./Sub.	Horse- power	Maxi- mum speed Surf. Sub.	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
SUBMARINES—contd.			Feet	Feet	Feet		Tons		Knots				Tons
† <i>Balao Class</i> —contd.													
Hammerhead	Manitowoc	1944	311½	27		2	1525 2400	6500	21	2 5-in., some smaller.	10 21-in.	60	
Hardhead	"	"											
Hawkbill	"	"											
Icefish	"	"											
Jallao	"	"											
Kraken	"	"											
Lamprey	"	"											
Lizardfish	"	"											
Loggerhead	"	1945											
Macabi	"	"											
Mapiro	"	"											
Menhaden	"	"											
Mero	"	"											
Sand Lance	Portsmouth,	1943											
Picuda	N.Y.	"											
Pampanito	"	"											
Parche *	"	"											
Bang	"	"											
Pilotfish *	"	"											
Pintado	"	1944											
Pipefish	"	"											
Piranha	"	"											
Plaice	"	"											
Pomfret	"	"											
Sterlet	"	"											
Queenfish	"	"											
Razorback	"	"											
Redfish	"	"											
Ronquill	"	"											
Scabbardfish	"	"											
Segundo	"	"											
Sea Cat	"	"											
Sea Devil	"	"											
Sea Dog	"	"											
Sea Fox	"	"											
Atule	"	"											
Spikefish	"	"											
Sea Owl	"	"											
Sea Poacher	"	"											
Sea Robin	"	"											
Sennet	"	"											
Piper (ex-Awa)	"	"											
Threadfin	"	"											
Spadefish	Mare Island,	"											
Trepang	N.Y.	"											
Spot	"	"											
Springer	"	"											
Stickleback	"	1945											
Tiru	"	Bldg.											
Tench	Portsmouth,	1944											
Thornback	N.Y.	"											
Tigrone	"	"											
Tirante	Cramp	"											
Trutta	Portsmouth,	"											
Toro	N.Y.	"											
Torsk	"	"											
Quillback	"	1945											
Trumpetfish	Cramp	1946											
Tusk	"	"											
Corsair	"	"											
Unicorn	"	Bldg.											
Walrus	"	"											
Argonaut	Portsmouth,	1945											
Runner	N.Y.	"											
Conger	"	"											
Cutlass	"	"											
Diablo	"	"											
Medregal	"	"											
Requin	"	"											
Irex	"	"											
Sea Leopard	"	"											
Odax	"	"											
Sirago	"	"											

* These boats were used in atomic tests at Bikini.

† Over eighty of these boats are to be fitted with "Schnorkel".

United States—continued.

Name or number	Where built	Completed	Dimensions			Number of screws	Displacement Surf./Sub.	Horse- power	Maxi- mum speed Surf. Sub.	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
			Feet	Feet	Feet		Tons		Knots				Tons
SUBMARINES—contd.													
† <i>Balao Class—contd.</i>													
Pomodon	Portsmouth	1945	311½	27		2	1525	6500	21	2 5-in., some	10	60	
Remora	N. Y.	1946					2400			smaller.	21-in.		
Sarda	"	"											
Spinax	"	"											
Volador	"	Bldg.											
Wahoo	Boston, N. Y.	1946											
Amberjack	"	"											
Grampus	"	Bldg.											
Pickrel	"	"											
Grenadier	"	"											
<i>Gato Class :</i>													
Gato	Electric Boat	1942	311½	27		2	1525	6500	21	2 5-in., some	10	60	
Greenling	Co.	"					2400			smaller	21-in.		
Grouper	"	"											
Guardfish	"	"											
Barb	"	"											
Blackfish	"	"											
Bluefish	"	"											
Cod	"	"											
Cero	"	"											
Drum	Portsmouth,	1941											
Flying Fish	N. Y.	"											
Finback	"	1942											
Haddock	"	"											
Kingfish	"	"											
Shad	"	"											
Silversides	Mare Island,	1941											
Whale	N. Y.	1942											
Angler	Electric Boat	1943											
Bashaw	Co.	"											
Bluegill	"	"											
Bream	"	1944											
Cavalla	"	"											
Cobia	"	"											
Croaker	"	"											
Dace	"	1943											
Flasher	"	"											
Flounder	"	"											
Gabilan	"	"											
Gunnel	"	1942											
Gurnard	"	"											
Haddo	"	"											
Hake	"	"											
Hoe	"	"											
Jack	"	1943											
Lapon	"	"											
Mingo	"	"											
Muskallunge	"	"											
Paddle	"	"											
Pargo	"	"											
Peto	Manitowoc	1942											
Pogy	"	"											
Pompon	"	1943											
Puffer	"	"											
Rasher	"	"											
Raton	"	"											
Ray	"	"											
Redfin	"	"											
Rock	"	"											
Sawfish	Portsmouth,	1942											
Steelhead	N. Y.	1943											
Sunfish	Mare Island,	1942											
Tunny	N. Y.	"											
Tinosa	"	"											
<i>"M" Class</i>													
Mackerel	Electric Boat	1941	253	21½	12	2	800	6,000	14½	1 3-in.			
Marlin	Co.	"											
	Portsmouth	1942	"	"	"	"	"	"	"	"	6	21-in.	
	N. Y.	"									"		

† Over eighty of these boats are to be fitted with "Schnorkel".

United States—*continued.*

Name or number	Where built	Completed	Dimensions			Number of screws	Displacement Surf./Sub.	Horse- power	Maxi- mum speed Surf. Sub.	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
SUBMARINES— <i>contd.</i>													
"T" Class Tambor	Electric Boat Co.	1940	307	27	13-3	2	1475 —		Knots	1 3-in.	10 21-in.		Tons
Thresher	"	1941	"	"	"	"				"	"		
Gar	Mare Island	1941	"	"	"	"	"			"	"		
*Tuna	N.Y.	"	"	"	"	"	"			"	"		
New "S" Class													
*Skipjack	Electric Boat Co.	1939	"	26	14½	"	1450 —		17 8	"	8 21-in.	55	
*Sea Raven	Portsmouth N.Y.	1940	"	"	"	"	"		"	"	"	"	
"S" Class													
†S35	Bethlehem Shipbuilding Corp., Union Plant	1923	219-3	20-5	16	2	800 1062	1200 1500	14-5 11	1 4-in.	4 21-in.	42	140
†S21	Bethlehem Shipbuilding Corp., Quincy Plant	"	"	"	"	"	"	"	"	"	"	"	"
DESTROYER ESCORTS													
<i>Rudderow Class :</i>													
Rudderow	Philadelphia,	1944	306	36½		2	1450	12,000	25	2 5-in. H.A./L.A.		220	
Day	N.Y.	"						T.G.		8 40-mm., 10			
Hodges	Charleston, N.Y.	"						Some T.E.		20-mm.			
John C. Butler	Consolidated	"											
O'Flaherty	Steel, Orange,	"											
Raymond	Texas	"											
Richard W. Suesens	"	"											
Abercrombie	"	"											
Robert Brazier	"	"											
Edwin A. Howard	"	"											
Jesse Rutherford	"	"											
Key	"	"											
Gentry	"	"											
Traw	"	"											
Maurice J. Manuel	"	"											
Naifeh	"	"											
Doyle C. Barnes	"	"											
Kenneth M. Willett	"	"											
Jaccard	"	"											
Lloyd E. Acree	"	"											
George E. Davis	"	"											
Mack	"	"											
Woodson	"	"											
Johnnie Hutchins	"	"											
Walton	"	"											
Rolfe	"	"											
Pratt	"	"											
Rombach	"	"											
McGinty	"	"											
Alvin C. Corkrell	"	"											
French	"	"											
Cecil J. Doyle	"	"											
Thaddeus Parker	"	"											
John L. Williamson	"	"											
Presley	"	"											
Williams	"	"											
Richard S. Bull	Brown-Hous-	"											
Richard M. Rowell	ton, Texas	"											
Dennis	"	"											
Edmonds	"	"											
Straus	"	"											
La Prade	"	"											
Jack Miller	"	"											
Stafford	"	"											
Walter C. Wann	"	"											
Le Ray Wilson	"	"											
Lawrence C. Taylor	"	"											

* These boats were used in atomic tests at Bikini.

† Designed by Electric Boat Co., Groton, Conn.

The machinery contractors for the vessels of the E.B. Co. Design built in yards other than the Navy Yards were the New London Ship and Eng. Co., Groton, Conn. and the hulls were built under sub-contract from the E.B. Co.

United States—continued.

Name or number	Where built	Completed	Dimensions			Number of screws	Standard Displacement	Horse-power	Maximum speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								Tons
DESTROYER ESCORTS —contd.			Feet	Feet	Feet		Tons		Knots				Tons
<i>Rudderow Class—contd.</i>													
Melvin R. Nawman	Brown-Houston, Texas	1944	306	36½		2	1450	12,000 T.G. Some T.E.	25	2 5-in. H.A./L.A., 8 40-mm., 10 20-mm.		220	
Oliver Mitchell	"	"											
Tabberer	"	"											
Robert F. Keller	"	"											
Leland E. Thomas	"	"											
Chester T. O'Brien	"	"											
Douglas A. Munro	"	"											
Duflho	"	"											
Haas	"	"											
Corbesier	Federal,	"											
Conklin	Newark	"											
McCoy Reynolds	"	"											
William Seiverling	"	"											
Ulvert M. Moore	"	"											
Kendall C. Campbell	"	"											
Goss	"	"											
Grady	"	"											
Charles E. Brannon	"	"											
Albert T. Harris	"	"											
Cross	"	1945											
Hanna	"	"											
Joseph E. Connolly	"	"											
Gilligan	"	"											
Formoe	Federal,	1944											
Heyliger	Newark	1945											
Edward H. Allen	Boston, N.Y.	1944											
Tweedy	"	"											
Howard F. Clark	"	"											
Silverstein	"	"											
Lewis	"	"											
Bivin	"	"											
Rizzi	"	"											
Osberg	"	"											
Wagner	"	Bldg.											
Vandivier	"	"											
Riley	Bethlehem,	1944											
Leslie L. B. Knox	Hingham	"											
McNulty	"	"											
Metivier	"	"											
George A. Johnson	"	"											
Charles J. Kimmel	"	"											
Daniel A. Joy	"	"											
Lough	"	"											
Thomas F. Nickel	"	"											
Peiffer	"	"											
Tinsman	"	"											
Eugene E. Elmore	Bethlehem, Quincy	1944											
Holt	Defoe S.B.	"											
Jobb	Co., Bay City	"											
Parle	"	"											
<i>Buckley Class :</i>													
Buckley	Bethlehem,	1943	306	37		2	1400	12,000 D. Some T.E.	25	3 3-in. H.A./L.A., 8 40-mm., 10 to 18 20-mm.		220	
Fogg	Hingham	"											
Thomas	Dravo,	"											
Bostwick	Wilmington	"											
Breeman	"	"											
Burrows	"	"											
Carter	"	"											
Clarence L. Evans	"	"											
Jacob Jones	Consolidated	"											
Hammann	Steel, Orange	"											
Robert E. Peary	"	"											
Pillsbury	"	"											
Pope	"	"											
Flaherty	"	"											
Herbert C. Jones	"	"											
Douglas L. Howard	"	"											
Farquhar	"	"											
J. R. Y. Blakely	"	"											
Hill	"	"											
Fessenden	"	"											
Frost	"	"											

United States—continued.

Name or number	Where built	Completed	Dimensions			Number of screws	Standard Displacement	Horse-power	Maximum speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
DESTROYER ESCORTS			Feet	Feet	Feet		Tons		Knots				Tons
—contd.													
<i>Buckley Class—contd.</i>													
Huse	Consolidated	1943	306	37		2	1400	12,000	25	3 3-in. H.A./		220	
Inch	Steel, Orange	"						D.		L.A., 8 40-			
Blair	"	"						Some		mm., 10 to 18			
Brough	"	"						T.E.		20-mm.			
Chatelain	"	"											
Neunzer	"	"											
Poole	"	"											
Peterson	"	"											
Reuben James	Norfolk, N.Y.	"											
Levy	Federal,	"											
McConnell	Newark	"											
Osterhaus	"	"											
Parks	"	"											
Baron	"	"											
Agree	"	"											
Amick	"	"											
Atherton	"	"											
Booth	"	"											
Carroll	"	"											
Cooner	"	"											
Eldridge	"	"											
Micka	"	"											
Trumpeter	"	"											
Straub	"	"											
Gustafson	"	"											
Samuel S. Miles	"	"											
Wesson	"	"											
Riddle	"	"											
Swearer	"	"											
Stern	"	"											
O'Neill	"	"											
Bronstein	"	"											
Baker	"	"											
Coffman	"	"											
Eisner	"	"											
Garfield Thomas	"	1944											
Wingfield	"	"											
Thornhill	"	"											
Rinehart	"	"											
Roche	"	"											
Lovelace	Norfolk, N.Y.	1943											
Manning	Charleston,	"											
Neuendorf	N.Y.	"											
James E. Craig	"	"											
Elchenberger	"	"											
Thomason	"	"											
Otter	"	1944											
William T. Powell	"	"											
Coolbaugh	Philadelphia,	1943											
Darby	N.Y.	"											
J. Douglas	"	"											
Blackwood	"	"											
Francis M. Robinson	"	1944											
Solar	"	"											
Fowler	"	"											
Spangenberg	"	"											
Stewart	Brown S.B.	1943											
Sturtevant	Co., Houston	"											
Moore	"	"											
Keith	"	"											
Tomich	"	"											
J. Richard Ward	"	"											
Otterstetter	"	"											
Sloat	"	"											
Snowden	"	"											
Stanton	"	"											
Swasey	"	"											
Marchand	"	"											
Hurst	"	"											
Camp	"	"											
Howard D. Crow	"	"											
Pettit	"	"											
Ricketts	"	"											
Sellstrom	"	"											
Harveson	"	"											

United States—continued.

Name or Number	Where built	Com- pleted	Dimensions			Number of screws	Standard displacement	Horse- power	Maxi- mum speed	Armaments	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
			Ft.	Ft.	Ft.		Tons		Knots				
DESTROYER ESCORTS —contd.													
<i>Buckley Class—contd.</i>													
Joyce	Consolidated,	1943	306	37		12	1400	12,000	25	3 3-in. H.A./ L.A., 8 40- mm., 10 to 18 20-mm.		220	
Kirkpatrick	Orange	"						D.					
Menges	"	"						Some					
Mosley	"	"						T.E.					
Newell	"	"											
Pride	"	"											
Falgout	"	"											
Lowe	"	"											
Thomas J. Gary	"	"											
Brister	"	"											
Finch	"	"											
Kretchner	"	"											
O'Reilly	"	"											
Koiner	"	"											
Price	"	1944											
Strickland	"	"											
Forster	"	"											
Daniel	"	"											
Roy O. Hale	"	"											
Dale W. Peterson	"	"											
Martin H. Ray	"	"											
Ramsden	Brown S.B.	1943											
Mills	Co., Houston	"											
Rhodes	"	"											
Richey	"	"											
Savage	"	"											
Vance	"	"											
Lansing	"	"											
Durant	"	"											
Calcaterra	"	"											
Chambers	"	"											
Merrill	"	"											
Haverfield	"	"											
Swenning	"	"											
Willis	"	"											
Janssen	"	"											
Wilhoite	"	"											
Cockrill	"	"											
Stockdale	"	"											
Hisson	"	"											
Ahrens	Bethlehem,	1944											
Alexander J. Luke	Hingham	"											
Robert I. Paine	"	"											
Foreman	Bethlehem,	1943											
Whitehurst	San Francisco	"											
Witter	"	"											
Willmarth	"	"											
Gendreau	"	"											
Fieblerling	"	1944											
William C. Cole	"	"											
Paul G. Baker	"	"											
Damon M.	"	"											
Cummings	"	"											
Vammen	"	"											
Wiseman	Dravo,	1944											
	Wilmington	"											
Harmon	Bethlehem,	1943											
Greenwood	Quincy	"											
Loeser	"	"											
Gillette	"	"											
Henry R. Kenyon	"	"											
Spangler	Defoe S.B.	1943											
George	Co., Bay City	"											
Raby	"	"											
Marsh	"	"											
Currier	"	"											
Osmus	"	"											
Earl V. Johnson	"	1944											
Holton	"	"											
Cronin	"	"											
Frybarger	"	"											
Bangust	Western, San	1943											
Waterman	Pedro	"											
Weaver	"	"											
Hilbert	"	"											

United States—continued.

Name or class name and number of vessels in commission	Where built	Completed	Dimensions			Number of screws	Standard Displacement	Horse- power	Maxi- mum speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
DESTROYER ESCORTS —contd. <i>Buckley Class—contd.</i>			Feet	Feet	Feet		Tons		Knots				Tons
Lamons	Western, San	1944	306	37		2	1400	12,000 D. Some T.E.	25	3 3-in. H.A./ L.A., 8 40- mm., 10 to 18 20-mm.		220	
Kyne	Pedro	"											
Snyder	"	"											
Hemminger	"	"											
Bright	"	"											
Tills	"	"											
Roberts	"	"											
McClelland	"	"											
Cates	Tampa,	1943											
Gandy	Florida	1944											
Earl K. Olsen	"	"											
Slater	"	"											
Oswald	"	"											
Ebert	"	"											
Neal A. Scott	"	"											
Muir	"	"											
Sutton	"	"											
Gunason	Consolidated	1944											
Major	Steel, Orange	"											
Weeden	"	"											
Varian	"	"											
Scroggins	"	"											
Jack W. Wilke	"	"											
FRIGATES— <i>Tacoma Class :</i>													
Brownsville	Kaiser, Rich-	1944	304	37½		2	1400	5500 (R.)	19	2 3-in., 4 40- mm., 6 20- mm.		180	
Bangor	mond, Cal. American S.B.	1944											
El Paso	Lorain												
Orange	Consolidated,	1944											
Corpus Christi	Cal.	"											
Hutchinson	"	"											
Gladwyne	"	"											
Moberly	Globe S.B. Co.,	1944											
Davenport	Wis.	"											
Muskegon	Leatham S.B.	1944											
Emporia	Wis.	"											
Groton	Walter Butler	"											
Grand Rapids	Wis.	"											
Woonsocket	"	"											
Dearborn	"	"											
Covington	Globe S.B.	"											
Sheboygan	Co., Wis.	"											
Abilene	"	"											
Beaufort	"	"											
Charlotte	"	"											
Manitowoc	"	"											
Peoria	"	"											
Lorain	American S.B.	"											
Milledgeville	Co., Lorain	"											
Greensboro	"	"											
Forsyth	American S.B.	"											
	Co., Cleveland	"											
CORVETTES— 18		1942	205	33		1	925	2,750 (R.)	16	1 4-in., 1 3-in. H.A.		120	
GUNBOATS— Charleston	Chas. N.Y.	1936	328½	41½	11½	2	2000	7,000 (G.)	20	4 6-in., 1 sea- plane		200	
Tacloban	"	1923	241	41½	10		1270	850 (R.)	12	3 4-in.		175	
*MOTOR TORPEDO BOATS— Vesper Type (138)		1942	70	19		3	43	4,050	40	2 21-in. (in tubes)		12	
Elco " (358)	"	"	80½	20½		3	45	4,050	40	4 21-in. (in racks)		14	
Huckins " (18)	"	"	78	19½	6	3	48	4,050	40	4 21-in. (in tubes)		12	
Higgins " (224)	"	"	78	20	6	3	46	4,050	40	4 21-in. (in racks)		12	
Trumpy " (24)	1944	63	15½	4	2	24	1,260	28	No torpedoes		10		
Elco " (49)	1941	77	20	5½	3	45	4,050	40	2 2-in.		12		

* U.S. Navy is to dispose of all its M.T.Bs., etc.

United States—continued.

Class name and number of vessels in commission	Where built	Completed	Dimensions			No. of screws	Standard Displacement	Horse-power	Maximum speed	Armament	Torpedo tubes	Complement	Fuel Oil
			Length (extreme)	Beam	Draught								
MOTOR GUN BOATS— P.G.Ms. (22 in number)		1943–1945	173½	23		2	295	3,750	22	1 3-in., 2 40-mm.			
MINELAYERS— Terror	Philadelphia	1942	453½	60½		2	5875	11,000 (G.)		4 5-in.		400	
Chimo		1943	188	37		1	700	600	10			100	
Planter		??	??	??		??	??	??	??			??	
Bastion		??	??	??		??	??	??	??			??	
Buttress		??	??	??		??	??	??	??			??	
Robert E. Smith Class—a number of ex-destroyers (see destroyer tables).													
MINESWEEPERS— Raven Class (66)		1940–1945	220½	32		2	890	3,500 (Dies. elect.)	18	1 3-in.		100	
Admirable Class (131)		1942–1945	184½	33		2	795	1,800 (Dies. elect.)	15	1 3-in.		100	
Accentor Class (64)		1941–1942	97	21			190	400 (D.)	10			50	
*Ellyson Class (20)		1941–1942	348	36		2	1030	50,000	35	3 5-in., 8 40-mm.			
Motor Minesweepers (approx. 300)		1941–	136	24½		2	210	1,000 (D.)	12	1 3-in.		50	
* A number of ex-destroyers (see destroyer tables).													
SUBMARINE CHASERS— PCE Type (50)		1943	184½	33			795	2,400 (D.)	20	2 3-in.		110	
PC Type (300)		..	173½	23			230	3,600 (D.)	20	1 or 2 3-in.		80	
PCS Type (60)		..	136	23½			267	1,000 (D.)	14½	2 3-in.		40	
SC Type (300)		1942	111	17			95	2,400 (D.)	20	1 3-in.		40	
..		1918	110	15½			75	660	17	1 3-in.		40	

SEAPLANE TENDERS.—Cumberland Sound, St. George, Hamlin, Kenneth Whiting, Albermarle, Curtiss, Currituch, Norton Sound, Pine Island, Salisbury Sound, 9,000 tons, 18 knots, 4 5-in., 24 seaplanes; Greenwich Bay, Floyds Bay, Gardiners Bay, Rockaway, Humboldt, Matagorda, Valcour, Timbalier, Duxbury Bay, Corson, Cook Inlet, Castle Rock, Suisun, Barataria, Bering Strait, Rehoboth, Orca, Uniamk, Onslow, Halfmoon, Coos Bay, Chinacoteague, Shellkoff, Yakutat, San Carlos, San Pablo, Absecon, Mackinac, Casco, Barnegat, 1,650 tons, 20 knots, 1 5-in. gun; several ex-merchant ships; Sandpiper, Thrush, Swan, Heron, Pelican, Avocet, Teal, Lapwing (1918–19), 840 tons, 14 knots, 2 3-in. (ex-minesweepers); William B. Preston, Ballard, Gillis, Childs (1919–20) (ex-destroyers).

DESTROYER TENDERS.—Hamul, Everglades, Frontier, Yellowstone, Klondike, Shenandoah, Arcadia (1945), 8,180 tons, 492 ft., 16½ knots; Dixie, Prairie, Piedmont, Sierra, Yosemite, Grand Canyon, Isle Royal, Tidewater, Bryce Canyon (1942–45) 9,450 tons, 530 ft., 18 knots; Altair, Denebola (1921), 6,250 tons, 423½ ft., 16½ knots; Dobbin, Whitney (1924), 8,325 tons, 483 ft., 16 knots; Cascade, Markab, 10,000 tons, 492 ft., 16½ knots; Alcor, 6,000 tons, 445 ft., 15 knots; Melville (1915), 5,250 tons, 417 ft., 15 knots; Black Hawk (1917), 5,600 tons, 420 ft., 12½ knots.

SUBMARINE TENDERS.—Fulton, Sperry, Bushnell, Howard W. Gilmore, Nereus, Orion, Proteus (1937), 9,250 tons, 529½ ft., 18 knots; Euryale (1941), 10,700 tons, 492½ ft., 16½ knots; Clytie, Aegir, Apollo, Anthedon (1945), 8,200 tons, 492 ft., 16 knots, 1 5-in. For rescue duties—Chanticleer, Coucal, Florikan, Greenlet, Kittiwake, Petrel (1940), 1,780 tons, 251½ ft., 16½ knots.

OCEAN TUGS.—77 in number—600 tons, 143 ft., 1,500 H.P. (D.), 12½ knots; 65 in number—1,280 tons, 205 ft., 3,000 H.P. (D. elect.), 16 knots.

SURVEYING SHIPS.—Pathfinder, Hydrographer, Oceanographer, Bowditch, Sumner, Dericason.

AMMUNITION SHIPS.—Pyro, Nitro, Lassen, Mount Baker, Rainier, Shasta, Mauna Loa, Mazama, Sangay, Wrangell, Akutan, Firedrake, Vesuvius, Mount Katmai, Great Sitkin, Paracutin, Diamondhead.

REPAIR SHIPS.—Mrdusa, Vestal, Vulcan, Ajax, Hector, Delta, Rigel, Briareus, Amphion, Cadmus, Xanthus, Laertes, Dionysus.

REPAIR SHIPS (Battle Damage).—Aristæus, Oceanus, Phaon, Zeus, Midas, Sarpedon, Telamon, Ulysses, Demeter, Diomedes, Helios (ex-LST's).

REPAIR SHIPS (I.C. Engines).—Oglala, Luzon, Mindanao, Tutvila, Oahu, Cebu, Culebra Island, Maui, Mona Island, Palawan, Samar, Kermat, Roosevelt, Hooper Island, Holland, Otus, Beaver.

REPAIR SHIP (Heavy Hull).—Jason, 9,100 tons, 530 ft., 19 knots, 4 5-in.

REPAIR SHIPS (Landing Craft).—Achelus, Amycus, Agenor, Adonis, Atlas, Egeria, Endymion, Coronis, Creon, Poseidon, Menelaus, Minos, Minotaur, Stentor, Tantalus, Typhon, Amphitrite, Askari, Bellerophon, Chimaera, Daedalus, Gordius, Indra, Krishna, Quirinus, Remus, Achilles, Proserpine, Sphinx, Satyr, Patroclus, Numitor, Myrmidon, Pentheus, Pandemus, Romulus.

REPAIR SHIPS (Aircraft).—Chourre, Webster, Aventinus, Chloris, Fabius, Megara.

United States—continued.

SALVAGE VESSELS.—Viking, Crusader, Discoverer, Diver, Escape, Grapple, Preserver, Shackle, Warbler, Willet, Anchor, Protector, Extricate, Restorer, Cable, Chain, Curb, Current, Deliver, Grasp, Safeguard, Seize, Snatch, Valve, Vent, Accelerate, Harjurand, Brant, Clamp, Gear, Weight, Swivel, Tackle, Bolster, Conserver, Hoist, Opportune, Reclaimer, Recovery.

OILERS.—Cohocton, Tamalpais, Caney, Anacostia, Soubarissen, Tomahawk, Sebee, Ponganset, Pomanset, Ocklawaha, Mascoma, Canaba, Kennebago, Escambia, Alagash, Tolovana, Chipola, Taluga, Severn, Nantahala, Manatee, Marias, Aucilla, Elokimin, Chikaskia, Caliente, Cacapon, Ashtabula, Cimarron, Platte, Brazos, Ramapo, Sapelo, Trinity, Sepulga, Salinas, Tippecanoe, Rapidan, Cuyama, Mattole, Kaweah, Laramie, Sabine, Chemung, Guadalupe, Salamonie, Kaskasia, Chicopee, Housatonic, Kennebee, Merrimack, Winoski, Kankakee, Lackawana, Mattaponi, Monongahela, Tappahannock, Patuxent, Victoria, Neches, Neosho, Suamico, Cache, Tallulah, Pecos, Atascosa, Chiwawa, Enoree, Saranac, Saugatock, Escalante, Neshanic, Niobrara, Millicoma, Schuylkill, Cossatot, Chepachet, Cowanesque.

GASOLINE TANKERS.—Nespelen, Natchaug, Namakagon, Mattabesset, Mogoketa, Chewaucan, Chestatee, Chehalls, Tombigee, Nemasket, Kishwaukee, Genesee, Elkhorn, Agawam, Susquehanna, Wabash, Rio Grande, Kern, Patapsco, Halawa, Kaloli, Mettawee, Pasquotank, Sakatonchee, Seckonk, Sequatchie, Wautauga, Ammonusuc, Calamus, Chiwaukum, Escatawpa, Gualala, Hiwassee, Kalamazoo, Kanawha, Ocklockonee, Oconee, Narraguagas, Ogeechee, Ontonagon, Yahara, Ponchatoula, Ouastinet, Sacandaga, Tetonkaha, Towaliga, Tularosa, Wakulla, Yacona, Waupaca, Manokin, Sakonnet, Conemaugh, Klaskanine, Shikellamy, Nanticoke, Michigamie, Klickitat.

HOSPITAL SHIPS.—Relief, Solace, Comfort, Hope, Merry, Bountiful, Samaritan, Refuge, Haven, Benevolence, Tranquillity, Consolation, Repose, Sanctuary, Rescue.

SHIPS OF THE LESSER NAVIES.

BELGIUM.

SLOOP.—**Artevelde** (1940), 1,600 tons, 26·5 knots, 3 4·1-in., 2 40-mm.
SAILING TRAINING SHIP.—**Mercator**.
MOTOR MINESWEEPERS (ex-R.N.).—8 in number, 255 tons, 10 knots.
DEPOT SHIP.—**Prinses Marie Jose**, 2,500 tons.

BULGARIA.*

MOTOR TORPEDO BOATS.—2 in number (Lurssen, 1939), and 2 in number (Varna, 1942), 60 tons, 30 knots, 1 m.a.a., 2 21-in. torpedo tubes.
PATROL VESSELS.—**Rila**, and one other (1941), 200 tons, **Smyeli, Khrabri, Strogi** (ex-French, 1907–08), 97 tons, 17 knots, 2 1·85-in., 1 m., 2 18-in. torpedo tubes.
MINESWEEPERS.—2 in number (ex-French, 1918), 350 tons, 17 knots.
TRAINING SHIPS.—**Tsar Assen** (ex-Dutch, 1912), 240 tons, 9 knots, 2 2·6-in., 1 m.; **Kamcia** (1898), 10 knots; **Simeon**, 600 tons, 2 8-in.
MOTOR BOATS.—**Vzrif** and **Capitan Minkoff** (ex-French, 1918), 40 tons, 14 knots, 2 m.; **Belmoretz** and **Chernomoretz** (ex-French, 1918), 77 tons, 17 knots, 1 1·85-in., 2 m.

CHINA.

LIGHT CRUISER.—**Kung Wei** (ex-H.M.S. *Aurora*), 5,270 tons, 506 ft., 32 knots, 6 6-in. guns, 8 4-in. (Not yet handed over.)
ESCORT VESSELS.—**Yat Sen** (1930), 1,600 tons, 16 knots, 1 6-in., 1 5·5-in., 4 3-in., **Tai Ping** (1943), ex-U.S.S. D.E. 47, 3 3-in., 4 40-mm., 11 20-mm., **Tai Kang** (1943), ex-U.S.S. D.E. 6.
HUNT CLASS DESTROYER (ex-H.M.S. *Mendip*), 1,000 tons. (Not yet handed over.)
CORVETTE.—(Ex-H.M.S. *Petunia*), 1 4-in. (sunk in collision, 1947).
GUNBOATS.—**Antung, Cho Kuan, Chu Tong, Chu Chien**, 740 tons, nine smaller.
RIVER GUNBOATS.—**Fa Ku** (ex-French), **Ying Ho** (ex-H.M.S. *Sandpiper*), 185 tons, 11½ knots, 1 3·7-in. howitzer, 1 6-pdr.; **Ying Teh** (ex-H.M.S. *Falcon*), 372 tons, 15 knots, 1 3·7-in. howitzer, 2 6-pdr.; **Ying Shan** (ex-H.M.S. *Gannet*), 310 tons, 16 knots, 2 3-in. h.a.; **Yung Ping** (ex-Japanese), 170 tons; **Yung An** (ex-Japanese), 170 tons; **Chang Teh** (ex-Japanese), 300 tons.
MINESWEEPERS.—900 tons, **Yung Sheng, Yung Shun, Yung Ting, Yung Ning** (ex-U.S.S. *Lance, Logic, Lucid, Magnet*).
PATROL BOATS.—2 in number, ex-U.S.S. P.C.E. 867, 869; 800 tons disp. L.S.T., ex-U.S.N., 9 in number, 1,625 tons; L.S.M., ex-U.S.N., 7 in number, 520 tons; L.S.I., ex-U.S.N., 7 in number, 380 tons; L.C.T., ex-U.S.N., 3 in number, 280 tons.
TRANSPORTS.—Ex-U.S.S. *Maumee*, 14,000 tons, and several others.

* Bulgaria has handed her navy over to the Soviet Union.

COLOMBIA.

DESTROYERS.—*Caldas* and *Antioquia* (Yarrow, 1934), 1,282 tons, 319 ft. B.P., 31 ft. beam, 36 knots, 4 4·7-in., 3 1·5-in. A.A., 2 depth charge throwers, 8 21-in. torpedo tubes, 296 tons of oil fuel, 140 complement. Fitted for minelaying.

GUNBOATS.—*Mariscal Sucre* (Yarrow, 1909), 125 tons, 23 knots, 2 3-in., 3 m.; *Pichinchá*, *Carabobó*, and *Junin* (ex-French, 1925), 200 tons, 13 knots, 1 3-in., 2 m.; *Barranquilla*, *Cartagena*, and *Santa Marta* (Yarrow, 1930), 140 tons, 13·5 knots, 2 3-in., 8 m.

RIVER GUNBOAT.—*Presidente Mosquera*, 200 tons, 2 1·5-in.

TRANSPORT.—*Fernandez Madrid*, 150 tons, 15 knots, 2 20-mm.

TRAINING SHIP.—*Cucutá* (ex-U.S.A., 1913), 5,378 tons gross, 10 knots.

SUBMARINE-CHASERS.—0 21, 0 22 (ex-U.S.N.), 45 tons, 23 knots, 1 20-mm.

OILER.—*Cabimas* (1924).

COSTA RICA.

Coastal craft only.

CUBA.

LIGHT CRUISER.—*Cuba* (Cramp, Philadelphia, 1911), 2,055 tons, 18 knots, 6,000 H.P., 2 4-in., 6 3-in. H.A., 4 6-pdr., 4 3-pdr., 2 m., 250 tons of coal.

GUNBOATS.—*General Zagas*, 500 tons, 2 1-pdr.; *Capitan Fernandez Quevedo* (Havana, 1932), 115 tons, 12 knots, 1 3-in. H.A., 2 1-pdr.; *Habana*, *Pinar del Rio*, *Villas*, and *Matanzas* (Havana, 1912), 80 tons, 12 knots, 1 1-pdr.; *24 de Febrero* and *10 de Octubre* (J. S. White, 1911), 218 tons, 12 knots, 3 8-pdr.; *Baire* (Danzig, 1906), 500 tons, 14 knots, 4 3-in., 2 3-pdr., 1 m.; *Yara* (Middlesbrough, 1905), 450 tons, 12 knots, 1 3-in. H.A., 2 6-pdr.; *20 de Mayo* (Glasgow, 1895), 200 tons, 12 knots, 2 3-pdr., 1 1-pdr.; *Enrique Villuendus* (ex-U.S.A., 1899), 178 tons, 16 knots, 2 3-pdr.; *Donativo* (1930), 130 tons; *Camaguey* (1922), 113 tons; *Oriente*, 110 tons; *Cuatro de Septiembre* (1942), 85 tons; *Santa Clara*.

TRAINING SHIP.—*Patria* (Cramp, Philadelphia, 1911), 1,200 tons, 16 knots, 2 3-in., 4 6-pdr., 4 3-pdr.

TRANSPORT.—*Carcorbe* (1907), 3,335 tons; *Colombia*, 1,119 tons.

SUBMARINE CHASERS.—12 in number (ex-U.S. C.G. Cutters), C.S. 11-14, 21-24, 31-34 (1941-44), 100 tons, 23 knots.

DOMINICAN REPUBLIC.

FRIGATE.—*Colon* (ex-H.M.C.S. *Carlplace*) (1945), 1,445 tons, 20 knots.

CORVETTE.—Reported purchased from Canada.

COAST GUARD CUTTER.—3 in number; C.G. 9, 10, 11 (ex-U.S.A. 1943), 47 tons, 13½ knots.

ECUADOR.

PATROL VESSELS.—*Neuve de Octubre* (ex-U.S.S. P.Y.18), 1940, 565 tons, 1 3-in., 2 20-mm.; *Cinco de Junio* (ex-U.S.S. A.P.C.85), 1948, 234 tons, 4 20-mm.; *Diez de Agosto* (ex-U.S.S. P.Y.8) 1941, 590 tons, 2 3-in.; *Atahualpa* (Guayaquil N.Y.), 1927 100 tons (lighthouse tender).

TRAINING SHIP.—**Presidente Alfaro** (Southampton, 1917), 1,030 tons, 16 knots, 2 3-in.

GUNBOAT.—**Abdon Calderon** (ex-Cotopaxi) (1884), 300 tons, 10·5 knots.

EGYPT.

PATROL VESSELS.—**Raqib** (Alexandria, 1938), 15 knots, 1 1·46-in. ; **Al Sarea** (J. S. White, 1937), 13 tons, 36 knots, 1 1·46-in. ; **El Amira Fawzia** (Swan Hunter, 1929), 2,640 tons, 14 knots, 2 3-pdr. ; **El Amir Farouq** (Hawthorn Leslie, 1926), 1,441 tons, 17 knots, 1 6-pdr., 2 m. ; **Mabahiss** (Swan Hunter, 1930), 618 tons, 11 knots, 1 3-pdr.

TRAINING SHIP.—**Abdel Monaym** (Clydebank, 1902), 610 tons, 13·5 knots.

INSPECTION VESSEL AND STORE CARRIER.—**Naphtys** (Kiel, 1905), 650 tons, 7·5 knots.

ROYAL YACHT.—**Mahroussa** (Poplar, 1865), 4,561 tons, 16 knots.

COASTAL MOTOR BOATS.—**Darfeel** and **Noor El Bahr** (Thornycroft, 1926), 20 tons, 17 knots, 1 1·46-in. ; **Qamar**, 23 tons, 11 knots ; **El Hoot**, 24 tons, 7 knots.

EIRE.

CORVETTES.—**Flower Class**, 3 in number (ex-H.M. ships *Borage*, *Oxlip*, and *Bellwort*), 1,000 tons, 16 knots, 1 4-in., 4 20-mm.

ESTONIA.

(See under Soviet Union.)

FINLAND.

GUNBOATS.—**Turunmaa** (ex-Russian Orlan, 1918), 342 tons, 14 knots, 2 3-in., 5 6-pdr. ; **Uusimaa** (ex-German Beo) and **Hämeenmaa** (ex-German Wulf, 1918), 400 tons, 15 knots, 2 4-in., 1 1·5-in. A.A. ; **Aallokas** (1935) (fishery protection).

MOTOR TORPEDO BOATS.—**Syöksy**, **Nuoli**, **Vinha**, and **Raju** (1929), 13 tons, 35 knots, 2 m., 2 18-in. torpedo tubes ; **J.1**, **J.2**, **J.3**, **J.4** (ex-Italian), 1942, 21 tons, 60 ft., 50 knots, 2 18-in. torpedoes, 1 m. Eight others (Helsinki) and two more building.

SUBMARINES.—Now incorporated in U.S.S.R. Baltic Fleet.

MINELAYERS.—**Pommi**, **Paukku**, **Lieska**, **Miina**, **Loimu** (1916), 80 tons, 8 knots, 2 m., 24 mines ; **Ruotsiinsalvi** (1940), 300 tons, 1 3-in., 1 40-mm., 2 20-mm.

MINESWEEPERS.—**Rautu** (ex-Russian Murman, 1917) ; **Ahven**, **Kiiski**, **Muikku**, and **Sarki** (1937), 17 tons, 10 knots. Four building, 2 *Kuha* type, 2 *Kallanpla* type.

SALVAGE VESSEL.—**Mursu** (ex-Stannum) (1902), 615 tons gross, 8 knots.

SUBMARINE DEPOT SHIP.—**Louhi** (ex-Russian Voin, 1917), 640 tons, 11 knots, 2 1·85-in., 150 mines.

MOTOR LAUNCHES.—**Haukka**, **B.V.A.**, and **B.V.D.** (1934), 9–25 tons, 8–10 knots, 1 m.

PATROL BOATS.—**V.M.V. 1**, **2**, **5**, **6** (1931), **V.M.V. 8–17** (Germany, 1935), 30 tons, 25 knots, 1·75-in. (**V.M.V. 10** and **14** reported sunk.)

TRAINING SHIP.—**Suomen Joutsen** (St. Nazaire, 1902), 3,000 tons, 6 knots.

ICEBREAKERS.—**Sisu** (Helsingfors, 1939), 2,000 tons, 15 knots, 2 4-in. ; **Otsu** (1936), 800 tons, 13 knots ; **Sampo** (Armstrong, 1899), 1,850 tons, 15 knots, 3 4·7-in. ; **Tarmo** (ex-Sampo II) (Armstrong, 1907), 2,400 tons, 14 knots ; 3 4·7-in. ; **Murtaja** (Stockholm, 1890), 820 tons, 11 knots, 1 4·7-in. ; **Apu** (Kiel, 1899), 600 tons, 13 knots, 2 4·7-in.

HAYTI.

SPECIAL SERVICE VESSEL.—**Savannah** (ex-U.S. C.G. Cutter), 53 tons, 20 knots, 1 20-mm.

HUNGARY.

PATROL VESSELS.—**Debreczen**, **Gyor**, **Baja**, and **Sopron** (Budapest, 1918), 140 tons, 15 knots, 2 2·75-in., 2 m. ; **Kecskemet** and **Szeged** (Budapest, 1915), 183 tons, 15 knots, 4 2·75-in., 2 m.

AUXILIARY VESSELS.—**Csobánc** (1926), 300 tons, 8 knots ; **Kőrös** (1916), 170 tons ; **Maros** (1927), 40 tons ; **Mecsek**, 35 tons.

MOTOR BOATS.—**Honved**, **Huszar**, and **Tuzer** (1916), 17 tons, 7 knots, 2 m. ; 2 in number, 30 tons ; 10 in number, 10 tons.

TRAINING SHIP.—**Badacsony** (1909), 230 tons, 10·5 knots.

ICELAND.

FISHERY PROTECTION VESSELS.—**Aegir** (1925), 500 tons, 14 knots, 1 2·24-in. ; **Thor** (ex-German, 1922), 300 tons, 10 knots, 1 2·24-in. ; **Odinn** (1938), 72 tons, 11 knots, 1 1·85-in. ; **Esja**, 1,347 tons (gross).

IRAQ.

PATROL VESSELS.—**Nos. 1, 2, 3, 4** (Thornycroft, 1937), 100 ft. length, 64 tons, 12 knots, 1 3·7-in. howitzer, 4 m.

YACHT.—**Panfio X** (ex-Sans Peur, J. Brown, 1923), 1,200 tons, 13 knots.

LATVIA.

(See under Soviet Union.)

LITHUANIA

(See under Soviet Union.)

MANCHUKUO.

(Prior to occupation by the Soviet Union.)

DESTROYER.—**Hai Wei** (ex-Japanese Kashi, Maizura, 1917), 755 tons, 31·5 knots, 3 4·7-in, 3 m., 6 18-in. torpedo tubes.

GUNBOATS.—**Chingjen** and **Tingpien** (Harima, 1935), 290 tons, 13 knots, 2 4·7-in., 3 m. ; **Shun T'ien** and **Yang Min** (Harima, 1934), 270 tons, 12 knots, 2 4·7-in. A.A., 3 m. ; **Li Sui** (ex-German, 1910), 270 tons, 13 knots, 2 2·24-in., 2 m. ; **Li Chi** (ex-German, 1904), 270 tons, 13 knots, 1 3-in., 4 m. ; **Kuang Ning**, **Kuang Ch'ing**, and **Chiang T'ung** (1900), 200 tons, 9 knots, 1 3-in., 4 m. ; **Ta T'ung** and **Li Min** (Kobe, 1933), 65 tons, 10·5 knots, 3 m.

ARMED LAUNCHES.—**Chi Min** (Kawasaki, 1934), 20 tons, 10 knots, 2 m.; **En Min**, **Hui Min**, **P'u Min** (Kawasaki, 1933), 15 tons, 10 knots, 2 m.

PATROL BOATS.—**Hailung** and **Haifeng** (Kawasaki, 1933), 184 tons, 14 knots, 2 8-1-in., 2 m.; **Hai Kuang**, **Hai Jui**, **Hai Jung**, **Hai Hua** (Kawasaki, 1933), 42 tons, 12 knots, 1 2-24-in., 2 m.; **Daichi Kaihen** and **Daini Kaihen** (Yokohama, 1933), 42 tons, 15 knots, 2 m.

MEXICO.

SLOOP.—**Durango** (Valencia, 1936), 1,600 tons, 20 knots, 4 4-in., 2 twin 1-in. pom poms, 2 quadruple .5-in. m., can carry 500 men and 80 horses; **Potosi** (Cadiz, 1935), **Queretaro** and **Guanajuato** (Ferrol, 1935), 1,200 tons, 20 knots, 3 4-in., 2 twin 1-in. pom poms, 2 quadruple .5-in m.a.a., can carry 250 men and 20 horses.

GUNBOATS.—**G. Nos. 20-27, 29** (Bilbao, 1935), 130 tons, 26 knots, 1 twin .5 pom pom, 1 quadruple 1-in. pom pom.

TRANSPORTS.—**Progreso** (Genoa, 1907), 1,590 tons, 18 knots, 4 6-pdr., 2 m.; **Orizaba** (ex-Southern Cross, Glasgow, 1930), 1,851 tons, 11 knots.

OIL TANKER.—**Maxico** (1913), 2,559 tons (gross).

PATROL BOATS.—**Mazatlan**, **Acapulco**, and **Vera Cruz** (Canada, 1918), 486 tons, 8 knots, 1 2-2-in., 2 1-5-in., 2 m., 2 ex-U.S., C.G. Cutters, C.S. 01, C.S. 02.

SUBMARINE CHASERS.—3 in number (ex-U.S.A.), **C.S. 11, 12, 13**, 99 tons, 1 40-mm.

NICARAGUA.

GUNBOAT.—**Momotombo**, 400 tons, 2 3-in., 1 6-pdr.

PATROL BOAT.—1 in number (ex-U.S.A., CG274) (1924), 87 tons, 75 ft., 13-5 knots, 1 1-pdr.

PARAGUAY.

GUNBOATS.—**Paraguay** and **Humaita** (Genoa, 1931), 636 tons, 17 knots, 4 4-7-in., 4 3-in. h.a., 2 m.; **Capitan Cabral** (England, 1910), 120 tons, 10 knots, 1 3-in., 2 6-pdr., 2 m.; **Taguari** (Hosking, 1910), 150 tons, 10 knots, 4 3-in., 2 1-46-in.

DESPATCH VESSEL.—**Teniente Herreros** (Conrad, 1908), 100 tons, 12 knots, 1 3-in., 2 1-pdr., 2 m.

PATROL VESSELS.—6 in number, 45 ft., 20 knots, ex-U.S. C.G. Cutters, transferred 1944.

PERSIA (IRAN).

PATROL VESSELS.—**Lal** (ex-Simorgh), **Hira** (ex-Chahbaaz), and **Nilam** (ex-Chahrokh) (Naples, 1932), 325 tons, 15 knots, 900 B.H.P., 2 3-in., 2 m.

MOTOR BOATS.—**Azerbaijan**, **Gehlani**, and **Masenderan** (Palermo, 1935), 68½ ft., 28 tons, 14 knots, 1 1-5-in.

TUG.—**Niru** (1935), 14 knots.

TRAINING SHIP.—**Chasevar**.

PERU.

LIGHT CRUISERS.—*Almirante Grau* and *Coronel Bolognesi* (Vickers, 1907), 3,200 tons, 24 knots, 2 6-in., 8 3-in., 8 m., 2 18-in. torpedo tubes.

DESTROYERS.—*Almirante Guise* (ex-Russian, 1917), 1,400 tons, 35 knots, 5 3-in., 1 2-pdr. A.A., 1 m., 3 18-in. triple torpedo tubes; 80 mines; *Almirante Villar* (ex-Russian, 1918), 1,185 tons, 35 knots, 4 4-in., 1 2-pdr., 2 m., 8 18-in. triple torpedo tubes, 80 mines.

SUBMARINES.—*B.1-4* (U.S.A., 1926-28), 576/682 tons, 14.5/10 knots, 1 3-in. 4 21-in. torpedo tubes.

GUNBOATS.—*Amazonas* and *Loreto* (Electric S.B. Co., 1984), 250 tons, 15 knots, 4 3-in. H.A., 2 8-in., 2 m.; *America* (1904), 350 tons, 14 knots, 2 3-pdr.; *Coronel Portillo* (ex-San Pablo, 1902), 49 tons, 7 knots, 2 3-pdr.; *Iquitos* (1875), rebuilt, 1896, 50 tons, 7.5 knots, 4 1.46-in., 2 8-in., 2 m.; *Napo* (Yarrow, 1921), 98 tons, 12 knots, 8 1.8-in.

TRANSPORTS.—*Rimac* (ex-Eten, 1907), 6,848 tons gross, 12 knots, cargo capacity, 7,000 tons; *Callao*, 5,578 tons.

OILERS.—*Parinas* (Thornycroft, 1921), 2,820 tons, 10 knots, carries 4,800 tons of oil; *Mariscal Castilla* (Montreal, 1942), 3,450 tons.

SUBMARINE CHASERS.—6 in number (ex-U.S.A.), *C.S. 1-6*, 45 tons, 24 knots, 1 20-mm.

TUGS.—(Ex-U.S.S. Y.T.2, Y.T.3), *Tigre*, *Curaray*, 210 tons.

PHILIPPINES.

Several coastal craft and landing craft on loan from U.S.N.

POLAND.

DESTROYERS.—*Blyskawica* (J. S. White, 1937), 2,144 tons, 39 knots, 8 4-in., 4 1.57-in., 2 triple 21-in. torpedo tubes; *Burza* (Chantiers Navals, 1932), 1,540 tons, 33 knots, 2 5.1-in., 1 2.9-in. H.A., 6 21.7-in. torpedo tubes.

SUBMARINES.—*Sep* (Rotterdam, 1939), 1,090/1,450 tons, 14.5/11 knots, 1 4.1-in., 2 1.57-in. A.A., 12 21.7-in. torpedo tubes; *Zbik*, *Rys*, and *Wilk* (built in France, 1931-32), 965/1,230 tons, 14/9 knots, 1 8.9-in., 1 2-pdr. A.A., 6 21.7-in. torpedo tubes, 40 mines.

MINESWEEPERS.—*Zuraw* (Gdynia, 1939); *Czajka* (Modlin, 1936); *Rybitwa* (Modlin, 1935), and *Mewa* (Gdynia, 1935), 140 tons, 15 knots, 1 3-in., 4 m.

TRAINING SHIP.—*Iskra* (ex-British, 1917), Three Masted Schooner, 500 tons.

MOTOR GUNBOATS.—2 ex-British. *S.1* (J. S. White, 1940), 36 tons; *S.2* (B.P.B. Co., 1940).

MOTOR TORPEDO BOATS.—2 ex-Russian (1945), 38 knots, 1 20-mm., 2 torpedoes.

MOTOR MINESWEEPERS.—Ex-Russian (1945), *Albatross*, *Czapla*, *Jaskolka*, *Jastrzab*, *Kania*, *Kondor*, *Kormoran*, *Krogulec*, *Orlik*, 130 tons, 10 knots, 2 1.85-in. A.A.

TANKER.—*Stutthof*, 450 tons.

WATERBOATS.—*Flehmendorf*, *Tiegendorf*, 500 tons.

PORTUGAL.

DESTROYERS.—**Douro, Tejo, Dao** (Yarrow, Lisbon, 1935–36), **Lima and Vouga** (Yarrow, Glasgow, 1933), 1,220 tons, 33,000 S.H.P., 36 knots, 4 4·7-in., 3 1·5-in. A.A. pom poms, 2 quadruple 21-in. torpedo tubes, 20 mines, complement 164. (Refitting at Yarrow's, 1947.)

MOTOR TORPEDOE BOATS.—6 in number.

SUBMARINES.—**Golfinho, Espadarte, Delfim** (Vickers, 1934–35), 900/1,100 tons, 2,800/1,000 B.H.P., 16·5/9·2 knots, 1 4-in., 2 m., 6 21-in. torpedo tubes.

GUNBOATS.—**Faro and Lagos** (Lisbon, 1928, 1932), 300 tons, 13 knots, 21·85-in.; **Ibo** (1912), **Mandovi** (1918), **Zaire** (1927), **Diu** (1932), built at Naval Arsenal, Lisbon, 400 tons, 13 knots, 2 3-in., 2 3-pdr., 2 m.

RIVER GUNBOATS.—**Rio Minho** (Lisbon, 1904), 37 tons, 7·5 knots, 1 1-pdr., 2 m.; **Tete** (Yarrow, 1904), 70 tons, 7·5 knots, 2 3-pdr., 3 1-pdr.; **Macau** (Yarrow, 1909), 94 tons, 2 6-pdr.

SLOOPs.—**Bartolomeu Dias and Afonso de Albuquerque** (Hawthorn Leslie, 1935), 1,780 tons, 21 knots, 4 4·7-in., 2 3-in. H.A., 4 pom poms, 2 depth charge throwers, 40 mines; **Joao de Lisboa** (ex-Infante don Henrique, 1937) and **Pedro Nunes** (1935), built at Lisbon, 1,080 tons, 17 knots, 2 4·7-in., 4 1·57-in. A.A., 2 depth charge throwers; **Goncalves Zarco and Goncalo Velho** (Hawthorn Leslie, 1933), 950 tons, 16·5 knots, 3 4·7-in., 2 1·57-in.

TRAINING SHIP.—**Sagres** (Bremerhaven, 1896), 3,100 tons, 7 knots.

AUXILIARIES.—**Vulcano** (Thornycroft, 1910), 500 tons, 12 knots. **Lidador** (Birkenhead, 1884), 200 tons, 9 knots, 2 3-pdr.

PATROL VESSELS.—**Azevia** (1941); **Bicuda; Corvina; Dourada; Espadilha; Fataca** (1942–44), 250 tons, 18 knots, 2 20-mm.

SURVEYING SHIPS.—**D. Joao de Castro** (Alfeite, 1941), 960 tons, 14 knots, 1 3-in., 1 aircraft; **Berrio** (La Loire, 1898), 350 tons, 10 knots; **Carvalho Araujo** (ex-H.M.S. Jonquil, 1915), 900 tons, 17 knots.

MINESWEEPER.—**Almirante Lacerda** (ex-H.M.S. Caraquet (Bangor)), 672 tons, 16·5 knots, 1 12-pdr., 1 2-pdr.

MINESWEEPING TRAWLERS.—(Ex-Isles Class), **Faial, S. Miguel, Santa Maria** (1942), 545 tons, 12 knots, 1 12-pdr., 2 20-mm. (Ex-Tree Class), **Terceira** (1940), 545 tons, 1 12-pdr., 2 20-mm.

LIGHTHOUSE TENDER.—**Almirante Schultz** (Penhoey, 1929), 520 tons, 11·5 knots.

TANKER.—**Sam Braz** (1942), 7,000 tons (capacity 3,500 tons), 12 knots, 1 3·9-in. A.A.

ROUMANIA.

DESTROYERS.—**Marasti** (ex-Italian Sparviero, 1917), and **Marasesti** (ex-Italian Nibbio), 1,460 tons, 40,000 S.H.P., 35 knots, 4 4·7-in., 4 1·46-in. H.A., 2 m., 2 double 18-in. torpedo tubes, 50 mines.

MOTOR TORPEDO BOATS.—**Viscolul** (ex-British, 1939), 70 ft. length, 30 tons, 41 knots, 8 m., 2 21-in. torpedo tubes. Nos. 4, 5, 6, 7, 8, 9 (1939), 2 20-mm.

TORPEDO BOATS.—**Sbornul**, and **Zmeul** (ex-Austrian, 1913–14), 260 tons, 28 knots, 1 2·6-in., 1 1·46-in., 2 torpedo tubes in **Sbornul**.

SUBMARINES.—**Delfinul** (Fiume, 1936), 700/950 tons, 1,600/1,800 S.H.P., 14/9·5 knots, 1 4·2-in., 6 21-in. torpedo tubes.

SUBMARINE DEPOT SHIP.—**Constanta** (Fiume, 1930), 1,821 tons, 13 knots, 2 4-in.

RIVER MONITORS.—**Ioan Bratianu** (Trieste, 1907–08), 680 tons, 13 knots, 3 4·7-in., 1 3-in. A.A., 2 1·85-in., 4 m.; **Bucovina** (ex-Austrian Sava, Budapest, 1916), 550 tons, 12 knots, 2 4·7-in., 2 4·7-in. howitzers, 2 2·6-in. A.A., 2 1·85-in., 6 m.; **Basarabia** (ex-Austrian Inn, Budapest, 1915), 590 tons, 12 knots, 2 4·7-in., 2 4·7-in. howitzers, 2 1·85-in., 9 m.; **Ardeal** (ex-Austrian Temes, Budapest, 1904), 450 tons, 10 knots, 2 4·7-in., 1 3·5-in. A.A., 2 1·85-in., 2 m.

GUNBOATS.—**Stihi** (ex-French Friponne, Lorient, 1917); **Ghiculescu** (ex-French Impatiente, Brest, 1916), 350 tons, 15 knots, 2 3·9-in., 2 m.

PATROL BOATS.—Nos. 3 and 7 (Thornycroft, 1908), 100 ft., 50 tons, 18 knots, 1 3-pdr., 1 m.

RIVER GUNBOATS.—**Bistritsa**, **Oltul**, and **Siretul** (Blackwall, 1888), 100 tons, 12 knots, 1 6-pdr., 1 1-pdr. 4 in number, launches (1921), 9 tons.

MINELAYERS.—**Admiral Murgescu** (Galatz, 1940), and **Cetetea Alba** (Hamburg, 1940), 812 tons, 16 knots, 2 4-in., 2 1·46-in., 135 mines.

YACHTS.—**Luceafarul** (Glasgow, 1931), 1,580 tons, 17 knots; **Taifun** (Royal Yacht) (J. S. White, 1938), 34 tons; **Macin**, 1912.

TRAINING SHIP.—**Mircea** (Hamburg, 1939), 1,750 tons, 10 knots.

MOTOR BOATS.—10 in number (some armoured), 40 tons, 14 knots.

ARMED MOTOR LAUNCHES.—7 in number, 30–50 tons.

VEDETTEs.—Nos. 1, 3, 4 (1906), 49 tons, 1 1·85-in., 1 20-mm.

THAILAND.

DESTROYER.—**Phra Ruang** (ex-British Radiant, Thornycroft, 1917), 718 tons, 29,000 S.H.P., 35 knots, 3 4-in., 1 2-pdr. pom pom., 1 m., 2 double 21-in. torpedo tubes.

TORPEDO BOATS.—**Jumbara**, **Pattani**, **Surasdra**, **Chandaraburi**, and **Rayong** (Monfalcone, 1937), 470 tons, 10,000 S.H.P., 31 knots, 3 3-in. A.A., 4 8-in. m., 6 18-in. torpedo tubes; **Puket** and **Trad** (Trieste, 1936), 380 tons, 9,000 S.H.P., 31 knots, 3 3-in. A.A., 4 8-in. m., 6 18-in. torpedo tubes.

MOTOR TORPEDO BOATS.—8 in number (Thornycroft, 1930–35), 55 ft., 13·5 tons, 2 torpedoes.

SUBMARINES.—**Blai Jumbol**, **Sinsamudr**, **Machanu**, **Virun** (Mitsubishi, 1938), 325 tons, 14·5/8 knots, 1 m., 5 21-in. torpedo tubes, complement 24.

GUNBOATS.—**Dhamburi** and **Sri Ayudhya** (Kobe, 1938), 2,000 tons, 15·5 knots, 4 8-in., 4 3-in.; **Sukhodaya** (Vickers, 1930), 890 tons, 13 knots, 2 6-in., 4 3-in. A.A., 2½-in. armour belt; **Mongkut Rajakumarn** (ex-Filipinas, Hong Kong and Whampoa Dock Co., 1887), 700 tons, 11 knots, 2 4·7-in., 2 6-pdr., 3 3-pdr.; **Sugbrib** (1901), 410 tons, 11·5 knots, 1 4·7-in., 5 6-pdr., 2 m.; **Suriya Monthon** (Thornycroft, 1908), 190 tons, 14·5 knots, 1 6-pdr., 4 m.; **Ratnakosindr** (Armstrong, 1925), 890 tons, 12 knots, 2 6-in., 4 8-in. H.A., 2½-in. armour belt.

MINELAYERS.—**Bang Rachan** (\$1) and **Nong Sarai** (\$2) (Monfalcone, 1936), 368 tons, 12 knots, 2 3-in., 140 mines.

PATROL BOATS.—**Klongyai, Takbai, and Kantang** (Yokohama, 1937), 110 tons, 18 knots, 1 3-in., 3 8-in. m., 2 18-in. torpedo tubes.

TRAINING SHIPS.—**Tachin** and **Maeklong** (Uraga, 1937), 1,400 tons, 17 knots, 4 4·7-in., 2 5-in. m. A.A., 2 double 12-in. torpedo tubes, 20 mines; **Chao Phra** (ex-British Havant, 1918), 700 tons, 16 knots.

SURVEY SHIPS.—**Kut** (ex-Han Thale), **Pai** (ex-Lieu Thale), and **Kram** (ex-Chen Thale), 400 tons, 8 knots; **Cuong**.

FISHERY PROTECTION VESSELS.—**Sara Sindhu, Thiew Uthok, Travane Vari** (Bangkok, 1936), 50 tons, 9·5 knots, 1 1·5-in.

TUG.—**Samet** (ex-Pi-Sua-Nam), 90 tons, 9·5 knots.

TRANSPORTS.—**Angthong** (ex-Maha Chakkri, Kawasaki, 1918), 2,700 tons, 15 knots, 4 3-in.; **Chang** (ex-Vides Kichkar, Maryport, 1902), 750 tons, 9·5 knots; **Pagan** and **Sichaun** (Harima, 1938), 650 tons.

OIL TANKER.—**Samul** (Hakodate, 1936), 1,800 tons, 12 knots.

TURKEY.

BATTLE CRUISER.—**Yavouz Sultan Selim** (ex-Goeben, Hamburg, 1912), 22,734 tons, 52,000 S.H.P., 27 knots, 10 11-in., 10 5·9-in., 8 3·5-in., A.A., 14 1·5-in. m.p.p., 4 m., 4 19·7-in. torpedo tubes, complement 1,000.

CRUISERS.—**Hamidieh** (Armstrong, 1904), 3,790 tons, 12,000 H.P., 22 knots, 2 5·9-in., 6 3-in., 8 3-in. H.A., 2 18-in. torpedo tubes, 70 mines; **Medjidieh** (ex-Russian Prutt, Cramp, 1904), 3,300 tons, 12,000 H.P., 22 knots, 4 5·1-in., 2 3-in. H.A., 4 m. (Both used as training ships.)

DESTROYERS.—**Gayret** (ex-H.M.S. Oribi, Fairfield, 1941), 1,540 tons, 34 knots, 4 4·7-in., 1 4-in., 4 2-pdr., 8 21-in. torpedo tubes; **Kocatepe** and **Adatepe** (Ansaldo, 1932), 1,300 tons, 33,000 S.H.P., 38 knots, 4 4·7-in., 3 2-pdr. H.A., 3 m., 6 21-in. torpedo tubes, 40 mines; **Tinaztepe** and **Zafer** (Riva Trigoso, 1932), 1,240 tons, 50,000 S.H.P., 38 knots, 4 4·7-in., 3 2-pdr. A.A., 2 triple 21-in. torpedo tubes; **Sultan Hisar** and **Demir Hisar** (Denny Bros., 1941); **Muavenet** (Vickers, 1941), 1,370 tons, 34,000 S.H.P., 35 knots, 4 4·7-in., 6 1·5-in. A.A., 2 quadruple 21-in. torpedo tubes.

TORPEDO BOATS.—**Berk** (ex-Berkisatvet) and **Peyk** (ex-Peikishevket, Kiel, 1907), 830 tons, 20 knots, 2 4-in., 4 6-pdr., 2 1-pdr., 2 m., 3 18-in. torpedo tubes, 30 mines.

MOTOR TORPEDO BOATS.—A number building, about 18 tons, 32 knots.

MOTOR LAUNCHES.—A number of ex-British Fairmiles.

PATROL MOTOR BOATS.—**Doghan, Marti, and Deniz Kusu** (Venice, 1932), 31 tons, 34 knots, 1 3-in., 1 1-in. pom pom., 2 18-in. torpedo tubes, 6 depth charges. A number building.

SUBMARINES.—**Burak Reis, Murat Reis, Oruc Reis** (Vickers, 1941), 624/856 tons, 1,200/708 H.P., 13·7/8·4 knots, 1 4-in., 3 m., 5 21-in. torpedo tubes; **Atilay, Yildiray** (Istanbul, 1941), **Saldiray**

(Kiel, 1939), 820/1,100 tons, 4,800 H.P., 20/9 knots, 1 4-in., 6 21-in. torpedo tubes, 40 mines; **Dumlupınar** (Monfalcone, 1932), 985/1,220 tons, 2,400/1,400 H.P., 15/9·5 knots, 1 4-in. H.A., 3 M., 4 2 1-in. torpedo tubes, 40 mines; **Gur** (Cadiz, 1931), 750/960 tons, 2,800/1,000 H.P., 20/9 knots, 1 4-in., 1 8-in. M., 6 21-in. torpedo tubes; **İnönü I** and **İnönü II** (Rotterdam, 1928), 438/556 tons, 1,100 H.P., 18·5/8·5 knots, 1 8-in. H.A., 1 M., 6 17·7-in. torpedo tubes; **Sakarya** (Monfalcone, 1932), 610/940 tons, 1,500/1,100 H.P., 14·5/9·3 knots, 1 4-in., 1 8-in. M., 6 21-in. T.T.

SUBMARINE DEPOT SHIPS.—**Erkin** (ex-S.S. Trier, Bremen, 1928), 16,000 tons, 12·5 knots, 2 M.; **Akin** (ex-Rasit, Smith's Dock Co., 1913), 33 tons, 12 knots; **Marmora** (ex-R.S. Syria, 1906), 1,500 tons.

MINESWEEPERS.—(Bathurst Class, ex-R.A.N.) **Ayancik**, **Amasra**, **Ayvalick**, **Antalya**, **Alanya** (1942), 650 tons, 2,000 H.P., 1 12-pdr.; **Hisir Reis**, **İssa Reis**, and **Kemal Reis** (La Seyne, 1912), 443 tons, 14 knots, 3 3-in., 2 3-pdr., 2 M.; 4 Motor Minesweepers (ex-British), **Bartin**, **Budrum**, **Bandirma**, **Bafra**, 255 tons, 12 knots; **Kavak**, **Canak** (1937), 52 tons, 15 knots; 16 converted ferry boats and coastal craft.

MINELAYERS.—**Sivri Hisar** and **Yuzbashi Hakki** (Thornycroft, 1940), 350 tons, 15 knots, 1 8-in., 80 mines; **Atak** and **Dalgitch** (Ismidt, 1940, 1941), 500 tons, 13 knots, 40 mines; **Nusret** (ex-Yardim, Kiel, 1913), 360 tons, 15 knots, 2 M., 25 mines; **Uyanik** (ex-Intibah, Port Glasgow, 1886), 600 tons, 12 knots, 50 mines. Several others.

OIL TANKERS.—**Gölcük** (Ismidt, 1937), 1,400 tons, 10 knots, 750 tons capacity; **Beykoz**, 435 tons (gross).

YACHTS.—**Gunes Dil** (ex-Savarona, Hamburg, 1931), 5,700 tons, 21 knots, 2 3-pdr.; **Ertugrul** (Armstrong, 1908), 900 tons, 21 knots, 8 3-pdr.; **Acar**, 63 tons, 12·5 knots; **Sugutli** (1903).

GUNBOAT.—**Aldin Reis** (St. Nazaire, 1913), 502 tons, 14 knots, 2 4-in., 2 6-pdr., 4 M.

DEPOT SHIP.—**Torghud Reis**.

MOTOR LAUNCHES.—8 in number, ex-R.N. H.D.M.Ls.; 12 in number, German.

URUGUAY.

TORPEDO GUNBOAT.—**Uruguay** (Stettin, 1910), 1,150 tons, 23 knots, 2 4·7-in., 4 8-in., 6 1-pdr., 4 M., 2 18-in. torpedo tubes.

PATROL BOATS.—**Paysandu**, **Salto**, and **Rio Negro** (Ancona, 1935), 150 tons, 16 knots, 2 3-in., 2 M.

SURVEYING SHIPS.—**18 De Julio** (Leith, 1879), 680 tons, 12 knots, 2 M.; **Capitan Miranda** (Cadiz, 1930), 516 tons, 12 knots.

TUGS.—**Zapican** (ex-Atlantico, 1911), 162 tons, 10 knots; **Van-guardia** (Glasgow, 1908), 95 tons, 12 knots, 2 1·5-in.; **Huracán** (ex-Fortuna, 1879), 197 tons, 12 knots.

TRAINING SHIP.—**Aspirante** (ex-Exir Dallen, 1919), 250 tons, auxiliary motor.

SUBMARINE CHASER.—(Ex-U.S.N. P.C. 1234), 280 tons, 22 knots, 2 3-in., 1 40-mm.

VENEZUELA.

MINELAYERS.—**General Soublotte** (ex-Italian Dardanelli) and **General Urdaneta** (ex-Italian Milazzo) (Monfalcone, 1926), 615 tons, 15 knots, 2 4-in., 1 3-in. H.A., 80 mines.

CORVETTES.—(Ex-R.C.N. Flower Class), **Independencia**, **Constitucion**, **Federation**, **Patria**, **Victoria**, **Libertad**.

GUNBOAT.—**General Salom** (ex-U.S. Atlanta, 1884), 750 tons, 12 knots, 1 3-in., 4 6-pdr., 2 m.

TUGS.—**Aragua** (ex-Caroni), 154 tons, 7 knots, 1 m.; **José Felix Ribas** (ex-Zumbador, 1894), 300 tons, 10 knots, 2 6-pdr., 1 m.

RIVER GUNBOATS.—2 in number.

YACHT.—**Leandro** (ex-Dr. Brinkley, U.S.A., 1925), 320 tons, 18 knots, 2 1·46-in.

PATROL VESSELS.—(Ex-U.S. C.G. Cutters, 1944), **Antonio Diaz**, **Brion**, **Briceno Mendez**, **Arismendi**, 53 tons, 23·5 tons, 1 20-mm.

COASTGUARD VESSEL.—**Torbes** (building).

YUGOSLAVIA.

DESTROYERS.—1 in number (building at Split), 1,875 tons, 38 knots, 5 5·5-in., 10 1·57-in. A.A., 2 m., 6 21-in. torpedo tubes. Two others building.

CORVETTE.—**Nada** (ex-H.M.S. Mallow), 1,000 tons, 16 knots, 1 4-in.

TORPEDO BOATS.—T. 1 and T. 5 (ex-Austrian, 1913–15), 200 tons, 5,000 S.H.P., 28 knots, 2 2·5-in. A.A., 2 m., 2 21-in. torpedo tubes.

MOTOR TORPEDO BOATS.—**Durmitor**, **Dinara**, **Kajmakalan**, **Orjen**, **Rudnik**, **Suvobor**, **Triglav**, and **Velebit** (Bremen, 1936–37), 92 ft., 62 tons, 84 knots, 1 1·57-in. A.A., 2 21-in. torpedo tubes; **Cetnik** and **Uskok** (Thornycroft, 1927), 59 ft., 13 tons, 40 knots, 1 m., 2 18-in. torpedo tubes. M.T. 1–8 (ex-U.S.N. P.T. boats), 46 tons, 1 40-mm., 1 20-mm., 2 torpedoes.

SUBMARINES.—**Hrabri** and **Nebojsca** (Armstrong, 1928), 870/1,146 tons, 2,400/1,600 B.H.P., 15/10 knots, 2 4-in., 6 21-in. torpedo tubes.

RIVER MONITORS.—**Varda** (ex-Austrian Bosnia, Budapest, 1916), 530 tons, 13 knots, 2 4·7-in., 2 4·7-in. howitzers, 3 2·6-in. A.A., 2 1·85-in., 8 m.; **Drava** (ex-Austrian Enns, Budapest, 1915), 450 tons, 13 knots, 2 4·7-in., 2 4·7-in. howitzers, 2 2·6-in. A.A., 7 m.; **Sava** (ex-Austrian Bodrog, Budapest, 1904), 380 tons, 13 knots, 2 4·7-in., 1 4·7-in. howitzer, 1 2·6-in. A.A., 1 2·6-in. howitzer, 5 m.; **Morava** (ex-Austrian Koros, Budapest, 1892), 390 tons, 9 knots, 2 4·7-in., 2 9-pdr., 3 m.

MINELAYERS.—**Galeb**, **Kobac**, **Orao**, **Sokol** (ex-German M class, 1918–19), 330 tons, 15 knots, 2 3·9-in. H.A., 2 m., 40 mines.

MINESWEEPERS.—**Malinska**, **Marjan**, **Meljine**, **Mijet**, and **Mosor** (Yarrow, Kraljevica, 1931–32), 130 tons, 9 knots, 1 2·5-in. A.A. D2 (ex-Austrian, 1889), 78 tons, 17 knots, 2 1·45-in., 1 m.; **Pionir** (Fiume, 1946), 530 tons.

SEAPLANE TENDER AND DEPOT SHIP.—**Zmaj** (Hamburg, 1929), 1,870 tons, 15 knots, 1 4-in. A.A., 10 seaplanes.

SUBMARINE DEPOT SHIP.—**Hvar** (ex-Vintali, Sunderland, 1896), 2,000 tons, 13 knots; **Sitnica** (ex-Najade, 1891), 370 tons, 9 knots, 2 8-pdr.

SALVAGE VESSEL.—**Spasilac** (Kiel, 1930), 740 tons, 15 knots.

TRAINING SHIP.—Three masted schooner **Jadran** (Hamburg, 1933), 710 tons, auxiliary motor, 8 knots, 2 2-pdr.

YACHTS.—**Vila** (ex-Dalmata, 1896), 230 tons, 12 knots; **Dragor** (1928), 250 tons, 10 knots.

TUGS.—**Ponderoso** (ex-Jaki) (1915), 360 tons, 15 knots, 2 1·85-in.; **Mocni** (Antwerp, 1939), 260 tons, 11 knots, 2 1·85-in.; **Silni** (1914), 200 tons, 10 knots, 2 1·85-in.; **Marljivi** (1898), 130 tons, 10 knots; **Snazni**, 100 tons, 10 knots; **Ustrajni** (1917), 160 tons, 9 knots; **Cer** (1909), 250 tons, 15 knots, 2 m.; **Sisak** (ex-Triglav, 1915), 90 tons, 11 knots, 2 m.; **Sabak** (ex-Avala), 90 tons, 8 knots, 2 m.

PATROL BOATS.—**Granicar** and **Strazar** (1929), 86 tons, 9 knots, 1 3-pdr.

NAVAL AIRCRAFT.—BRITISH.

Name	Type	Dimensions				Weight		Engine			Performance					Armament		
		Span	Length	Height	Wing area	Empty	Loaded	Name	Type	B.H.P.	Speed at Ht.		Service Ceiling	Range			Initial Climb	
											ft. in.	ft. in.		ft. in.	sq. ft.			lb.	lb.	M.P.H.	ft.	Miles	Speed at M.P.H.	Ft./min.
Fairey Firefly IV.	Low wing, single-engine, 2-seat naval reconnaissance fighter.	41 2	37 11	14 4	330		13,200	Rolls-Royce Griffon 74.				max. 386	14,000		Normal 740; max.; 1070 with drop tanks.	220	20,000 in 10·5 min.	4 20-mm. cannon; can also carry 8 pairs of rocket projectiles or 2 1000-lb. bombs.
Vickers-Armstrongs Supermarine Sea Otter I.	Single-engine, 3/4-seat spotter reconnaissance general purpose amphibian biplane.	46 0	39 5	16 2 on wheels and tail down.	610		10,000 approx.	Bristol Mercury 30.		870		163	17,000		690			Bombs or depth charges, 3 Vickers .303 "K" gun.
Vickers-Armstrongs Supermarine Seafire XV.	Single-engine single-seat fighter.	36 10	31 10	10 8	242		8000	Rolls-Royce Griffon VI.				max. 400		35,000			4680	2 20-mm. cannon, 4 .303 M.G.s.

Vickers-Armstrongs Supermarine Seafang.	Single-engine, single-seat fighter	35 0	32 11	13 5	210	Rolls-Royce Griffon 69.		450	21,000	730	20,000 in 6 min.	4 20-mm. cannon.
Hawker Seafury X.	Single-seat naval fighter.	38 5	34 6	14 7 tail down.	280	Bristol Centaurus XVIII.	11,990	460	24,500	max. 1160 miles with drop tanks.	20,000 in 6-3 min.	4 20-mm. cannon and either 2 1000-lb. bombs or 6 pairs of rockets.
Blackburn Firebrand Mk. IV.	Single-seat torpedo carrier and fleet fighter.	51 3	39 1		381 5	Bristol Centaurus IX.	11,357 max. 16,227	max. 350	13,000	745	2600 without torpedo 2300 with.	4 20-mm. cannon, 1 1850-lb. torpedo.
De Havilland 103 Sea Hornet XX.	Single-seat twin-engine naval fighter.	45 0	34 6	11 2 tail down.	361	Rolls-Royce Merlin.	18,250	max. 450		2000 with drop tanks.		4 20-mm. cannon, 2 1000-lb. bombs, 860-lb. rockets.
De Havilland 100 Vampire.	Single-seat twin-boom jet-propelled fighter monoplane.	40 0	30 8	8 1	266	D.H. Goblin turbo-jet unit.	8000	max. 540				4 20-mm. cannon.
De Havilland Sea Mosquito Mk. 33.	Two-seat twin-engine fighter.	54 2	44 6	17 5	454	Rolls-Royce Merlin 25.	22,500	380		1680 with drop tanks.		4 20-mm. cannon.
Fairey Barracuda V.	Single-engine two-seat torpedo monoplane.	53 2	40 3	15 3	425	Rolls-Royce Griffon VII.	16,400	max. 264	11,000	Normal 735, max. 1200 with drop tanks.	5000 in 25 min.	One forward-firing 50 cannon, 1 18-in. torpedo or bombs, mines, depth charges, up to 2000 lb.

NAVAL AIRCRAFT.—BRITISH—continued.

Name	Type	Dimensions				Weight		Engine			Performance					Armament	
		Span	Length	Height	Wing area	Empty	Loaded	Name	Type	B.H.P.	Speed at Ht.		Service Ceiling	Range	Initial Climb		
											ft. in.	ft. in.					ft. in.
Fairey Spearfish.	Two-seat, single-engine, bomber reconnaissance monoplane.	60 0	45 4	16 6	530		24,000	Bristol Centaurus 57.	Two-row radial air-cooled.	2585	max. 301	16,000		900	196	15,000 in 9 min.	Two fixed forward-firing .50 M.G. 18-in. torpedo or bombs, mines, depth charges, up to 2000 lb.
Vought Sikorsky Corsair.	Single-engine single-seat fighter.	41 1	32 10	12 2	314		12,039	Pratt and Whitney Double Wasp.	18-cylinder radial.	2000	417	19,900	35,000	1700		2890	Six .50 M.G.
Vultee Vengeance.	Two-seat single-engine dive-bomber.	48 0	39 9	14 6	332		13,500	Wright Cyclone R2600-13.	14-cylinder radial air-cooled.	1700	max. 279		27,000				4 or 6 .50-cal. M.G. 2500-lb. bombs.
Sikorsky Helicopter R-6 Hoverfly II.	Two-seat observation helicopter.	Rotor 38 0	over-all 47 11		Rotor disc 1134			One Franklin C-405-9.	6-cylinder horizontally opposed fan-cooled.	245	100	10,000	10,000	5 hrs. duration.		5900 in 7 min.	
Fairey Swordfish.	Single-engine 2/3-seat, torpedo spotter biplane.	45 6	Land 35 8 Sea 40 6	Land 12 4 Sea 14 7	549	Land 4700 Sea 5300	Land 6750 Sea 7360	Bristol Pegasus.		750	Land 144 Sea 134	5000	19,250	720	131	1120	Bombs, a torpedo or mine, 1 Vickers, 1 Lewis M.G.

NAVAL AIRCRAFT.—UNITED STATES OF AMERICA.

Name	Type	Dimensions				Weight		Engine			Performance					Armament	
		Span	Length	Height	Wing area	Empty	Loaded	Name	Type	B.H.P.	Speed at Ht.		Service Ceiling	Range			Initial Climb
											M.P.H.	ft.		Miles	Speed at M.P.H.			Ft./min.
Curtiss Seahawk SC-1.	Single-seat ship-bourne scout.	41 0	36 5				6200	Wright 1830-62.	9-cylinder radial air-cooled.	1350	max. over 300	34,000	over 1000		4 ·50-cal.		
Convair Sentinel.	Observation scout.	24 1	34 0	7 1		1517	2050	Lycoming O-435.		185	129	15,300	270				
Convair Privateer PB4Y-2.	Long-range patrol bomber.	110 0	74 0	26 0	1048	37,765	62,000 to 65,000	Four Pratt and Whitney R1830-94.	14-cylinder radial.	1200 each	max. over 250	21,200	over 3000		12 ·50-cal. M.G. 6000-lb. bombs or depth charges.		
Convair Liberator B24J.	Long-range bomber.	110 0	67 2	17 7	1048	36,294	60,000	Four Pratt and Whitney Twin Wasp R1830-65.	14-cylinder two-row radial.	1200 each	max. 297	25,000	1540	237	10 ·50-cal. M.G. 8000-lb. bomb load.		
Lockheed Harpoon PV2.	Twin-engine 4-seat patrol bomber.	75 0	52 0			21,623	32,000	Two Pratt and Whitney R2800-31.	18-cylinder radial.	2000 each	over 300	27,000	over 2000		9 ·50-cal. M.G. 1 torpedo.		
Lockheed Vega Ventura B34 and B37.	Twin-engine 4-seat patrol bomber.	65 6	51 7	14 1	551	19,373	26,500	Two Pratt and Whitney R2800-31.	18-cylinder radial.	2000 each	over 300	25,000	over 1000		4 ·50-cal. M.G. 2 ·30 M.G. Bombs—2500 lb. and 6 325-lb. depth charges, or one standard 22-in. torpedo.		

NAVAL AIRCRAFT.—UNITED STATES OF AMERICA—continued.

Name	Type	Dimensions				Weight		Engine		Performance					Armament
		Span	Length	Height	Wing area	Empty	Loaded	Name	Type	B.H.P.	Speed at Ht.	Service Ceiling	Range	Initial Ceiling	
		ft. in.	ft. in.	ft. in.	sq. ft.	lb.	lb.				M.P.H.	ft.	Miles	Ft./min.	
North American Mitchell PB1J.	6-seat patrol bomber.	67 7	53 6	16 5	609	21,000	33,500	Two Wright Cyclone R2600-13.	Two-row radial air-cooled.	13,000 each	303 max.	13,000	over 2000	15,000 in 11-3 min.	6-50-cal. M.G. 6000-lb. bombs,
Convair Coronado PB2Y-5.	Patrol bombing 4-engine seaplane.	115 0	79 3	27 6	1780	39,662	66,000	Four Pratt and Whitney R1830-92.	Radial air-cooled.	1200 each	max. 194	20,800	max. 1070		3 power turrets with -50-cal. M.G.
Convair Catalina PBY-5A.	Patrol bombing 2-engine seaplane.	104 0	63 10	18 10	1400	17,564	34,000	Two Pratt and Whitney R1830-92.	Radial air-cooled.	1200 each	max. 196	15,800	2520	5000 in 4-5 min.	
Martin Mariner PBM-3: 5.	Patrol bombing 2-engine seaplane.	118 0	77 2	17 6		32,328	56,000	Two Wright Cyclone R2600-12.	14-cylinder two-row radial.	1700 each	max. over 200	20,200	max. 3000		
Ryan FR-1. Fireball.	Carrier-based fighter.	40 0	32 4	13 7		7685	10,595 (max.)	One Wright Cyclone R-1820-72W. One General Electric J-31-3 turbine jet.	9-cylinder air-cooled radial.	1350	426	18,100	1030	4800	4 -50 Browning M.G. 1 1000-lb. bomb or 8 60-lb. rocket bombs.

Chance Vought F4U-4 Corsair.	Carrier-based strike fighter.	40 11	33 8	14 9	314	9336	13,625 max.	One Pratt and Whitney Double Wasp R-2800- 18.	18-cylinder air-cooled radial.	2100	425	23,000	41,800	1120	174	3340	6 .50 M.G. 8 60-lb. rocket projectiles, 1 bat remote-control glider-bomb.
Grumman Tigercat F7F-2.	Twin-engine carrier fighter. 2-seat night. 1-seat day.	51 6	45 5			16,592	13,000 to 21,738	Pratt and Whitney R2800- 23W.	18-cylinder double-row	2100	425		37,800	1500		3000	6 .50-cal.
Grumman Hellcat F6F.	Single-engine single-seat fighter.	42 10	33 7	13 0	334	9080	12,598	Pratt and Whitney R2800- 10W.	18-cylinder double-row radial air-cooled.	2100	400	18,800	37,800	1800		3000	6 .50 M.G.
Chance Vought Kingfisher OS2U.	Single-engine 2-seat scout sea or land plane.	35 11	33 7	14 8	261-9	3335	4980	Pratt and Whitney Wasp Junior R985.	Radial air-cooled	450	171	5000	18,200	908	152		2 .30 M.G. 2 100-lb. bombs.
Fairchild XNQL.	Single-engine 2-seat, navy primary trainer. (Prototype.)	41 5	27 11	9 10			3700	Lycomings	9-cylinder	320	max. 170					1000	
Douglas Skyraider.	Single-engine attack torpedo bomber, carrier-borne.	50 6	39 3	15 10	400		16,120	Wright 3350-24W.	18-cylinder twin-row radial.	2540	max. over 357			over 1150			Torpedoes, bombs, Rockets up to 6000 lb.
Lockheed Neptune P3V-1.	Land-based long-range bomber, 8-seat.	100 0	75 6	28 0		32,926	54,498	Two Wright 779C- 18BBL.		each 2300	max. 287		24,000	3500			

NAVAL AIRCRAFT.—FRANCE.

Name	Type	Dimensions				Weight		Engine			Performance						Armament
		Span	Length	Height	Wing area	Empty	Loaded	Name	Type	B.H.P.	Speed at Ht.		Service Ceiling	Range		Initial Climb	
											M.P.H.	ft.		ft.	Miles			Speed at M.P.H.	Ft./min.
Short Sunderland III.	Reconnaissance and anti-submarine, 4-engine, flying-boat.	112 9	85 4	32 10	1487	34,500	58,000	Bristol Pegasus XVIII.	9-cylinder radial air-cooled	815 each, max. 1065	max. 210	6500	16,000	normal 1780, over-load 2900		720	8-303 M.G.
Vickers Wellington	Twin-engine anti-submarine.	86 2	64 7	17 5	840		31,000	Bristol Hercules XVII.	Sleeve-valve radial.	1680	max. 250		16,000	max. 1760			
Avro Anson.	Liaison and training.	56 6	42 3	13 1	463	6510	8500	Two Armstrong Siddeley Cheetah.	Radial air-cooled.	320 each.	max. 170	sea-level	19,500	600	160	750	
Supermarine Vickers Armstrongs	Fighter	36 10	31 10		242		8000				max. 400		35,000				2 20-mm. cannon and 4-303 M.G.
Lockheed (Vega) Ventura.	Patrol monoplane.	65 6	51 7	14 1	551	19,373	26,500	Two Pratt and Whitney R2800-31.	18-cylinder radial air-cooled.	2000 each	max. over 300		25,000	over 1000			4-50-cal. M.G. 2-30 M.G. Up to 2 500-lb. bombs, 6 325-lb. depth charges.
Convair Catalina PBV5A.	Patrol and anti-submarine.	104 0	63 10	18 10	1400	17,564	34,000	Two Pratt and Whitney R1830-82.	Radial air-cooled.	1200 each	max. 196	7500	15,800	2520		5000 in 4-5 min.	

Douglas Dauntless.	Scout bomber	41 0	32 0	13 0	325	6535	9519	One Wright R1820-66 Cyclone.	9-cylinder radial air-cooled.	1200	max. 255	14,000	25,200	diver- bomber 456, scout- bomber 773.	10,000 in 10 min.	2 .50-cal. Browning. 2 .30 M.G. Dive- bombing, 1 1000-lb. and 2 100-lb. Scout- bombing, one 500-lb. and 2 100-lb.
A.A.G.I. (ex-JU52).	Transport	95 10	62 0	14 10	1190	14,325	24,200	Three B.M.W. 132 A or T.	9-cylinder radial.	760 each	max. 165	A.S.L.	18,000	800	10,000 in 17 min.	1 13-mm., 2 7.9-mm. M.G.
NC 701 (ex-Sebel 74).	Transport and liaison	69 9	39 2				12,300	Two Argus AS411.	12-cylinder inverted V, air-cooled.	600 each	max. 230	7600		930		
Vickers Super- marine single-seat fighter.	Fighter	36 10	30 10	13 6	242	6145	7335	Rolls- Royce Merlin 55 or 56.	12-cylinder V, liquid- cooled, in-line.	1185	over 400	10,500	35,600			2 20-mm. cannon. 4 303 Browning M.G.
Domier DO24.	Flying-boat anti-submarine training and air-sea rescue.	88 7	72 2	17 10	1162		29,700	Three B.M.W. 132.	9-cylinder radial air-cooled.	760 each	max. 190		17,400	2050		3 M.G. 12 100-lb. bombs.
Bloch 175	Torpedo carrier	96 0	79 8				over 49,280	Two engine Gnome et Rhône 14N.	14-cylinder double- row, air- cooled.	2800 total	330					1 torpedo and 20-mm. guns.
Braquet 730	Long range patrol flying-boat.	132 0	80 0				62,720	Four Gnome et Rhône 14N.	14-cylinder air-cooled.	4800 total	130			2734	150	
Laté 298 (ex- torpedo).	Training, single engine.							Hispano 12Y (one).	12-cylinder liquid- cooled.	900	max. 180					
Nord 1000 (ex-ME108).	4-seat liaison	36 0	29 6				6812	Renault (one) SQ10.		220	186			500	155	
Noreclair 1500.	Torpedo-carrier	64 7	46 8	21 5	495	15,454	23,800	Two Gnome et Rhône.	14R25	1600 each	335	10,000	32,850	2143		

Note.—The Noreclair is not yet (March 17, 1947) in service with French navy.

MISCELLANEOUS.

CENTRAL ORGANISATION FOR DEFENCE.

WHITE PAPER (CMD. 6928) ISSUED OCTOBER, 1946.

I. INTRODUCTION.

1. In the White Paper on Defence (Cmd. 6743) which was presented to Parliament in February 1946, His Majesty's Government announced their intention of putting forward at an early date their proposals for a central organisation for defence which would embody the improvements suggested by the experience of the last six years. The enquiry which was then proceeding has now been completed, and the changes which His Majesty's Government propose to make in the existing organisation are explained in this paper.

The main features of the new organisation proposed are summarised in paragraph 20 and explained in greater detail in the succeeding paragraphs. These proposals do not involve any drastic break with the past : they are rather designed to carry a stage further the process of steady evolution through which our central organisation for defence has developed during the past forty years. His Majesty's Government have therefore thought it convenient to preface their new proposals with a short account of the existing organisation and the stages by which it has been evolved during the twentieth century.

II. HISTORICAL REVIEW.

2. The year 1904 marks the real beginnings of our central organisation for defence. The defects in our military machinery which were brought to light by the Boer War led to the appointment of Lord Esher's War Office (Reconstitution) Committee, which in its first Report, dated January 1904, made the following statement :

"The British Empire is pre-eminently a great naval, Indian, and Colonial Power. There are nevertheless no means for co-ordinating defence problems, for dealing with them as a whole, for defining the proper functions of the various elements, and for ensuring that, on the one hand, peace preparations are carried out upon a consistent plan, and, on the other hand, that in time of emergency a definite war policy, based upon solid data, can be formulated."

The remedy proposed and adopted was the establishment of the Committee of Imperial Defence, which came into existence under a Treasury Minute dated May 4, 1904.

3. The founders of the Committee of Imperial Defence were concerned to design a mechanism which would not run counter to current conceptions of Cabinet government, and would not interfere with the collective and individual responsibility of Ministers to Parliament. The Committee of Imperial Defence was therefore established as an advisory body ; but in order that its recommendations should carry due weight the Prime Minister was made the Chairman and only permanent member. He was given absolute discretion in the selection of persons, whether Ministers, officials, or experts, to attend its meetings. This arrangement secured to the new

body both authority and flexibility. A small permanent secretariat was established to arrange the business and keep the records of the Committee and thus to provide continuity in its proceedings.

4. In the decade before the war of 1914-18 the Committee of Imperial Defence was engaged in formulating the principles to govern our defence policy and in planning the transition from peace to war. These tasks were accomplished with success ; and at the outbreak of war in 1914 we had well-laid plans for the transition from peace to war and better machinery than we had ever had before for concerting the actions of Government Departments in war. The Committee of Imperial Defence was not, however, designed to take executive control in war, nor had it developed any central machinery for inter-Service planning. The first of these defects was remedied by the establishment of the War Cabinet at the end of 1916. But no machinery for inter-Service planning was created during that war : each Service remained separately responsible for the planning and conduct of its operations, without any central co-ordination.

5. The need for inter-Service planning was emphasised by the advent of a third Fighting Service, the Royal Air Force. Special attention was drawn to this in the Report (Cmd. 2029) of the Salisbury Committee on National and Imperial Defence in 1923 ; and in 1924 the Chiefs of Staff Committee was established and the foundations of the Joint Staff system were laid. This organisation was developed under the Chiefs of Staff Committee in the years between 1924 and 1939.

6. The outbreak of the war in 1939 found us with plans fully prepared both for the transition from peace to war and for the setting up of machinery for the conduct of war. A War Cabinet was immediately established, which worked with the assistance of the Chiefs of Staff Committee and other Committees taken over from the Committee of Imperial Defence. The Minister for the Co-ordination of Defence, who had been appointed in 1936 to assist the Prime Minister in the task of overseeing the rearmament programme, at first remained in office as a member of the War Cabinet, but his position was anomalous. He could not control the mobilisation and direction of the whole resources of the nation for total war, a task which of necessity falls to the Prime Minister, nor had he any specific responsibility for knitting together the activities of the three Services. The post was abolished in April 1940.

7. When Mr. Churchill became Prime Minister he assumed the additional title of Minister of Defence. A Defence Committee (Operations) was set up, which for the greater part of the war consisted of the Prime Minister and Minister of Defence (in the Chair), the Deputy Prime Minister, the Foreign Secretary, the Minister of Production, the Service Ministers and the Chiefs of Staff, other Ministers attending when matters affecting their departmental responsibilities were under consideration. This Committee examined the military plans prepared by the Chiefs of Staff and the Joint Staffs and took decisions on behalf of the War Cabinet. A parallel body, the Defence Committee (Supply), dealt with the main lines of the production programmes. The duties of the Prime Minister as Minister of Defence were never defined. It was left for Mr. Churchill to develop a method of working, through the Defence Committee and the Chiefs of Staff Committee, which enabled him to provide the drive without which successful warlike operations cannot be conducted.

8. In the course of this development certain changes affecting the position of the Service Departments gradually took place. The Service

Ministers continued to be associated with the operational conduct of the war through their membership of the Defence Committee ; but the Chiefs of Staff in their corporate capacity became the authority which issued to Commanders-in-Chief unified operational instructions and strategical guidance on the conduct of the war. The responsibility for the day-to-day administration of the Services remained with the Service Departments, who followed up the central directives issued by the Chiefs of Staff with detailed instructions to their own Commanders-in-Chief on such matters as the composition, equipment, and movement of the forces under their command and the provision of reinforcements and supplies. The corporate authority of the Chiefs of Staff in the higher direction of the war, under the immediate supervision of the Prime Minister, was further consolidated, after the entry of the United States into the war, by the institution of the Combined Chiefs of Staff in Washington, by the appointment of Anglo-American Supreme Commanders, and by the close relations which developed between the President of the United States and the Prime Minister of the United Kingdom.

9. No Ministry of Defence was created during the war. The Minister of Defence operated by bringing together from the Service Departments and elsewhere those Ministers or officials who would be responsible for the execution of plans when approved. He used as his staff the small military Secretariat of the War Cabinet, which had previously served the Committee of Imperial Defence. The military head of the Secretariat became his chief Staff Officer and a member of the Chiefs of Staff Committee. The task of the Secretariat was to draft reports and telegrams on behalf of the Chiefs of Staff, to ensure co-ordination and continuity in the activities of the various committees and sub-committees dealing with military questions, and generally to facilitate the smooth running of the inter-Service machine. It was not their duty to act as military advisers to the Minister of Defence. It was their duty to procure for him advice from those who would be responsible for action.

10. This account of developments during the late war would be incomplete without a reference to the great progress made in the direct association of scientists with the work of the Service Departments and other Departments. It is not possible to give in this paper a full description of this association. It is enough to say that in the design and development of weapons and equipment, in the study of tactical methods, and in foreseeing and counteracting the enemy's technical progress scientists played an invaluable part. Experience during the war showed that any future development of our central organisation for defence would be incomplete if it did not provide throughout for the closest possible integration of scientific and military men.

III. COMMENTARY.

11. This short sketch of the development of our central war machine shows that in those aspects of defence preparation which require collaboration between the military and civil agencies of government we were fully prepared both in 1914 and in 1939. This part of the work of the Committee of Imperial Defence had been well done and the transition from peace to war was smoothly made.

12. In many respects, however, we were in 1939 dangerously unprepared for war. Qualitatively our Navy and Air Force were not badly

equipped, but there were serious gaps. We were dangerously short of destroyers and other escort vessels. We were inadequately supplied with aircraft and anti-aircraft artillery. Our Army was small and badly equipped, and had so little munitions production behind it that if the fighting on the Continent in 1940 had been prolonged we should soon have been short of every kind of ammunition.

13. This failure to equip our forces on an adequate scale was mainly due to the political and economic circumstances of the decade before 1939, which had the result of postponing until far too late the start of an effective programme of rearmament. With these considerations this paper is not concerned. There was, however, one defect of organisation which contributed to the unpreparedness of the Services, viz. the absence from the machinery of the Committee of Imperial Defence of a guiding hand to formulate a unified defence policy for the three Services. For lack of such a unifying influence separate aspects of our defences tended to be examined one by one. Thus, the Admiralty building programme, the strength of the Metropolitan Air Force, the number of guns and searchlights to be deployed in the Air Defence of Great Britain, the equipment of the Field Force—each of these subjects came up for review separately. There was no provision within the central organisation for the regular examination of Service programmes to ensure that, if war came, we should be ready in all important respects to meet it.

14. This weakness was not remedied by the appointment of a Minister for Co-ordination of Defence. His duties were strictly limited to co-ordinating and he had no power to take executive action. He was not given responsibility to Parliament, nor did he have any jurisdiction over the apportionment of the available resources between the three Services.

15. During the war a unified defence policy was achieved by the assumption of executive control by the Prime Minister and Minister of Defence. How is it to be achieved in peace?

One method would be to amalgamate the three Services completely and to place them under a single Minister of the Crown. This has been advocated by some as the logical development of the close relation which has been built up during the war between the operation of forces by sea, land, and air and as a means of giving full play to scientific development in weapons. His Majesty's Government do not wholly reject this conception: it may be that at some stage in the future amalgamation might be found desirable. They have decided, however, that this is a step which could not and should not be taken here and now.

16. Another method which has been suggested from time to time is the creation of a "Combined General Staff." Critics of our organisation have contended that the Chiefs of Staff Committee and the Joint Staffs for planning, intelligence, and administrative planning do not form a combined General Staff in the sense of an impartial central organisation which plans operations without regard for Service prejudice or sectional interests. Our own experience, however, and a close study of captured German archives showing the working of the German Oberkommando der Wehrmacht (O.K.W.) combine to demonstrate that this conception is not only inferior to our Joint Staff system, but has defects which in practice proved disastrous. The German system failed because the Planning Staffs of the O.K.W. were not drawn from this headquarters of the three Services. The plans they produced had later to be handed to those headquarters for execution, and were often found to be unrealistic. The cleavage between

planning and execution set up dangerous antagonisms and entirely nullified any theoretical advantages of the German system.

17. It has always been a cardinal principle of the British organisation that, alike in the Chiefs of Staff Committee and in the Joint Staffs, it should be the men responsible in the Service Departments for carrying out the approved policy who are brought together in the central machine to formulate it. The soundness of this principle has been amply proved in practical experience in war. The methods employed in the British organisation were adopted without alteration in the machinery of the Combined Chiefs of Staff and at the various Anglo-American headquarters formed in the field.

18. It has sometimes been suggested that, even though our Joint Staff system is based on sound principles, it would be improved by the appointment of an independent Chairman of the Chiefs of Staff Committee, either a civilian of wide experience and proved ability or an ex-Chief of Staff. This suggestion ignores the facts as they exist and as they have existed for many years. It has always been recognised that, whenever he sees fit, the Prime Minister can himself preside at meetings of the Chiefs of Staff Committee. Before the war the Minister for Co-ordination of Defence was also empowered to assemble the Committee and to take the Chair himself. During the war there were many occasions on which the Prime Minister in his capacity as Minister of Defence did preside over the Chiefs of Staff Committee, and at all times he took a most active part in directing the work of the Committee in accordance with the demands of the general situation. By this means the Prime Minister was able to place ideas before the Chiefs of Staff for professional examination, to keep them in touch with political matters which had military implications, and thus to direct in a broad way the work of the Joint Staffs as a whole. The Prime Minister did not, however, act as the mouthpiece of the Chiefs of Staff before the Cabinet and Defence Committee.

IV. PROPOSALS.

19. *Outline of New Organisation Proposed.*—After reviewing the development of our defence organisation over the last forty years and its practical performance under the test of two major wars, His Majesty's Government are satisfied that there are no grounds for any drastic recasting of the main structure of the organisation as it exists to-day. Some changes are, however, required in order to consolidate the advances which have been made in recent years under the compulsion of war or of the threat of war. Above all, experience during these years has shown the need of a Minister who has both the time and the authority to formulate and apply a unified defence policy for the three Services; and it is proposed that this need should be met by the creation of a Minister of Defence.

20. The form of the new organisation proposed may be summarised as follows:

- (a) The Prime Minister will retain the supreme responsibility for defence.
- (b) The Defence Committee, under the Chairmanship of the Prime Minister, will take over the functions of the old Committee of Imperial Defence, and will be responsible to the Cabinet both for the review of current strategy and for co-ordinating departmental action in preparation for war.

- (c) A new post of Minister of Defence, with a Ministry, will be created. The Minister of Defence will be responsible to Parliament for certain subjects, which are defined in paragraph 26 below, affecting the three Services and their supply. In addition, he will be Deputy Chairman of the Defence Committee; and he will also preside over meetings with the Chiefs of Staff whenever he or they may so desire.
- (d) The Chiefs of Staff Committee will remain responsible for preparing strategic appreciations and military plans and for submitting them to the Defence Committee; and the Joint Staff system will be retained and developed under their direction.
- (e) The Service Ministers will continue to be responsible to Parliament for the administration of their Services in accordance with the general policy approved by the Cabinet and within the resources allotted to them.

The above summary is elaborated in the following paragraphs.

21. *The Defence Committee.*—The appointment of a Minister of Defence will relieve the Prime Minister of that part of his general responsibility for national defence which is concerned with the inter-relation of the three fighting Services and their supply. There remains, however, the organisation for national defence in its broader aspect, including both current questions of high policy in the sphere of defence and also the preparation of plans over the whole field of Government activity, both civil and military, for mobilising the entire resources of the nation in a major war. These problems engage the collective responsibility of the Government as a whole. They must therefore be handled under the authority of the Cabinet itself.

22. It is proposed that there should be a Defence Committee to deal with these problems, under the Cabinet. It will be responsible both for the review of current strategy and also for the preparation of plans for the country's transition from peace to war, and will thus discharge the tasks carried out before the war by the Committee of Imperial Defence.

23. The Prime Minister will be Chairman of the Defence Committee. Its composition will be flexible. The Prime Minister, the Minister of Defence, the Lord President of the Council, the Foreign Secretary, the Chancellor of the Exchequer, the Service Ministers, the Minister of Labour, and the Minister of Supply will be regular members of the Committee, and the Chiefs of Staff will be in attendance. Such other Ministers, officers, and officials as may be required will be invited to attend meetings of the Committee according to the subjects under discussion.

24. The preparation of plans for mobilising the nation's resources in war will, as stated above, involve the collaboration of almost all government agencies, both civil and military. This task will be undertaken by a system of Sub-Committees working under the general direction and authority of the Defence Committee. These Sub-Committees will be constituted mainly at the official level, as were the Sub-Committees of the Committee of Imperial Defence before the war, and will include representatives of the Services, Service Departments, and Civil Departments, and, where necessary, persons outside government service altogether.

25. The Prime Minister must be Chairman of the Defence Committee by virtue of his ultimate responsibility for national defence. When international relations are stable, however, it will be neither possible nor neces-

sary for him to attend all the meetings of the Committee ; and it is desirable that he should have as Deputy Chairman a senior Minister who can relieve him of as much as possible of the detailed work of supervising the preparation of our defence plans. The Minister of Defence will undertake this task. In this capacity he will be able to exercise a general supervision over the preparations which are being made for national defence as a whole through the various Sub-Committees of the Defence Committee.

26. *Functions of the Minister of Defence.*—Apart from his duties as Deputy Chairman of the Defence Committee, it is proposed that the Minister of Defence should, as such, be responsible for the following functions :

- (a) The apportionment, in broad outline, of available resources between the three Services in accordance with the strategic policy laid down by the Defence Committee. This will include the framing of general policy to govern research and development and the correlation of production programmes.
- (b) The settlement of questions of general administration on which a common policy for the three Services is desirable.
- (c) The administration of inter-Service organisations, such as Combined Operations Headquarters and the Joint Intelligence Bureau.

The Minister will bring his proposals under (a) before the Defence Committee and the Cabinet. He will present the Cabinet's decisions on these to Parliament, and will decide questions arising between the three Services in their application. He will not be responsible for the subsequent detailed execution of the approved programmes, which will be the task of the Service and Supply Ministers. As a consequence of (b) he will answer questions in Parliament on matters common to the three Services or to the three Services and the Ministry of Supply. The machinery through which the Minister will discharge his responsibilities is described below.

27. *The Apportionment of Resources.*—The new organisation must be such as to ensure that the resources available for defence are laid out to the best advantage in terms of manpower, weapons, and equipment, works services, amenities, etc. A beginning was made this year with a new procedure for determining Service Estimates in total, which it is proposed to develop so as to enable provision for defence to be dealt with as a single problem in the light of the economic position and strategic requirements of the country. The Chiefs of Staff will advise the Defence Committee on our strategic requirements from year to year. It will then be for the Service Departments to translate these requirements into terms of men, money, and supplies, and for the Minister of Defence to co-ordinate the results, with the help of the Chiefs of Staff and the Committee of Service Ministers described in paragraph 29 below, and to present to the Defence Committee a coherent scheme of expenditure which will give the country forces and equipment in properly balanced proportions. On production questions there will be a standing Ministerial Production Committee consisting of the Service Ministers, the Minister of Supply, and the Minister of Labour, over which the Minister of Defence will preside. Working for this Committee there will be a Joint War Production Staff, composed of serving officers and representatives of the Service and civil Departments concerned, under a permanent Chairman who will be appointed to the staff of the Minister of Defence.

With the help of this organisation, the Minister of Defence will be able to frame comprehensive defence proposals in the form of a consolidated estimate for presentation to the Defence Committee and the Cabinet.

28. *Peace-time production programmes cannot be determined without regard to questions of war potential.* The size of peace-time stocks of equipment must be related to the rate at which production can develop in emergency. It will be the duty of the new Minister's Production Committee, assisted by the Joint War Production Staff, to study all and especially the wider aspects of our war potential, and for this purpose these bodies will be regarded as sub-committees of the Defence Committee. The President of the Board of Trade and such other Ministers as may be concerned from time to time will be co-opted to the Ministerial Committee to assist in the work.

29. *Administrative Questions of Common Interest to the Three Services.*—Within the resources allotted to them, the Service Ministers will continue to be responsible to Parliament for the maintenance and administration of their own Services. The appointment of the Minister of Defence will afford an opportunity to build up, for the handling of administrative questions which are of common interest to the three Services, machinery independent of the Chiefs of Staff organisation which will give full scope for collaboration by the Service Ministers and the administrative branches of their departments. The Minister of Defence will establish a Standing Committee of the three Service Ministers meeting under his Chairmanship. This will be served by inter-Service Consultative Committees of Principal Personnel Officers and Principal Supply Officers, which will also be linked up in operational matters to the Chiefs of Staff Committee. The Minister will thus discharge these functions in relation to the Services by making full use of the staffs of the Service Ministries on the proved Joint Staff system.

30. *Administration of Inter-Service Organisations.*—The Minister of Defence will assume control of inter-Service organisations such as Combined Operations Headquarters, the Joint Intelligence Bureau, and the Imperial Defence College, and their staffs will be borne on his Vote. For the present the only inter-Service bodies to be so transferred are organisations concerned with planning, intelligence, and staff training which have developed out of the Joint Staff system and are closely integrated with the work of those Staffs. A study is being made, however, of the possible advantages of drawing together certain administrative services which are now provided separately for each of the three fighting Services, e.g. the medical services, and forming a combined organisation which would provide those services in common for all branches of the Armed Forces. If, as a result of this examination, such amalgamation were found to be desirable, these common services might at a later stage be placed under the Minister of Defence and administered directly by him. His Majesty's Government have not reached a decision on this matter; and, if they should subsequently decide in favour of amalgamation, further proposals for this purpose would be presented to Parliament.

31. *Relations of the Minister of Defence with the Chiefs of Staff.*—The Chiefs of Staff organisation has been highly developed during the war and its value has been fully proved. No change is therefore contemplated in the organisation of the Chiefs of Staff Committee, which will continue as at present, together with the Joint Staffs for strategic planning, intelligence, and administrative planning. The Chiefs of Staff Committee will retain

their responsibility for preparing strategic military plans and submitting them to the Defence Committee. On all technical questions of strategy and plans it is essential that the Cabinet and Defence Committee should be able to have presented to them directly and personally the advice of the Chiefs of Staff, as the professional military advisers of the Government. Their advice to the Defence Committee or the Cabinet will not, therefore, be presented only through the Minister of Defence. At the same time, the organisation on which they rely in their collective capacity will be within the new Ministry, and the Chiefs of Staff will meet under the Chairmanship of the new Minister whenever he or they may so desire. Thus, it will be after such consultation with them that he will formulate his proposals for the apportionment of resources between the three Services. Before any major strategical plan is submitted to the Defence Committee, he will usually discuss it with the Chiefs of Staff, though not with a view to acting as their mouthpiece in the Defence Committee.

82. *Organisation for Formulation of Policy for Research and Development.*—The problem here is to secure the continued and complete integration of military and scientific thought at all levels and to see that, in planning Defence Research as a whole, account is taken of the scientific effort of the country in other fields in order that our resources may be efficiently and economically used. For this purpose there will be a Committee on Defence Research Policy, consisting of those responsible, both from the operational and scientific angle, for research and development in the Service Departments and the Ministry of Supply. This will advise, on operational questions, the Chiefs of Staff and, on wider aspects, the Defence Committee. Its Chairman will be a scientist of high standing, appointed for the purpose for a period of years. He will exercise his functions under the authority of the Minister of Defence, with whom will rest, as stated in paragraph 26, responsibility for the framing of general policy to govern research and development.

83. *Home Security.*—In any future war the problems of home security will assume an importance even greater than that which they had in the late war. It is essential that in military preparations full weight should be given to the probable demands of the home security services, and His Majesty's Government have considered the desirability of extending the functions of the Minister of Defence to cover this field. They have concluded, however, that it would be wrong to do this. Home security embraces a large number of activities apart from the air raid precautions and fire services, such as the maintenance of food supplies for the civil population, transport, hospitals, and so on, which fall within the province of the civil Ministries, and to give the Minister of Defence charge of all this would be to give him functions far outside his intended scope. It will be the duty of the Defence Committee to link home-security problems to broad defence policy, and the Home Defence Committee has already been reconstituted for the purpose.

84. *Ministry of Defence.*—The functions assigned to the Minister of Defence are such that it will not be possible for him to operate only through a small Secretariat. He will from the outset assume control over certain existing inter-Service organisations and on this account alone will need a Department with a separate Vote. If it were decided to amalgamate, under his control, some of the common services which are now provided separately for each of the three branches of the Armed Forces (see paragraph 30 above), a considerable body of administrative staff would then be

appointed to his Department to undertake the detailed control of those common services. For the discharge of the functions described in this paper, however, the Minister will not need a large staff. He will have as his principal advisers a Permanent Secretary, a Chief Staff Officer, the Chairman of the Joint War Production Staff, and the Chairman of the Committee on Defence Research Policy. These will be assisted by a relatively small staff, partly civil and partly military, which among their other duties will provide the Secretariat for the Committees and Joint Staffs through which the Minister will mainly work. The civil members of this staff will be drawn from the Civil Service in the normal way. The military members will be seconded from the three Services, as are the military officers of the Cabinet Secretariat.

V. ORGANISATION FOR COLLECTIVE DEFENCE.

35. Through the central machinery described in Part IV of this paper His Majesty's Government will discharge their responsibility for organising the defence of the United Kingdom. Our defence problems cannot, however, be viewed in isolation. We must be ready to play our part in any measures of collective defence which may be organised under the ægis of the United Nations; and we must maintain and develop our machinery for collaboration in the defence of the British Commonwealth and Empire.

36. *Commonwealth Collaboration.*—Methods of collaboration between the various members of the Commonwealth are governed by the principle enunciated in the Statute of Westminster. Even before 1923 the conception that there should be a central authority in London, representative of all the self-governing members of the Commonwealth, to review defence questions and prepare central plans which would be binding on the whole Commonwealth and Empire was never recognised as practicable even if it were desirable. Admittedly the Dominions have a close interest in problems that affect the Commonwealth and Empire as a whole, but each of them has a special and distinct outlook on world affairs, dependent on its geographical position and its political and economic environment, and Dominion Governments must retain full liberty of action. Co-operation in Commonwealth Defence has therefore always taken the practical form of promoting uniformity of organisation, training, and equipment of military forces, maintaining the closest possible touch between Staffs, and interchanging officers in order to promote a common doctrine and outlook in military affairs. Collaboration in war-time between the naval, land, and air forces from different parts of the Commonwealth has thus been easy and effective.

37. Since 1923 the natural tendency of the different parts of the Commonwealth to view problems from their own individual standpoint has become more marked. During the recent war no attempt was made to revive the Imperial War Cabinet of 1917-18, but this did not prevent the maintenance of a very close touch between the Governments of the Commonwealth, not only by telegraphic means but by constant meetings between Ministers, officers, and officials on all levels. In this way it was possible to make common plans for military action, for the co-ordination of munitions production, and for the co-operation of scientists and technicians in research and development. This flexible system of handling problems of mutual concern has proved very effective, and it was the object of study at the recent discussions in London in the spring of 1946. The

attitude of the assembled representatives of the Governments of the Commonwealth is illustrated by the *communiqué* issued at the conclusion of those discussions. Though this was concerned with consultation with the Dominions generally, it is fully applicable to our existing methods of consultation on defence questions. The following is an extract from that *communiqué* :

" At the conclusion of the meetings the assembled representatives of the United Kingdom, Canada, Australia, New Zealand, and South Africa place on record their appreciation of the value of this series of consultations, which exemplify the system of free discussion and exchange of view that characterises the relations of the countries of the British Commonwealth.

" The existing methods of consultation have proved their worth. They include a continuous exchange of information and comment between the different members of the Commonwealth. They are flexible and can be used to meet a variety of situations and needs, both those where the responsibility is on one member alone and where the responsibility may have to be shared.

" They are peculiarly appropriate to the character of the British Commonwealth, with its independent members, who have shown by their sacrifices in the common cause their devotion to kindred ideals and their community of outlook. While all are willing to consider and adopt practical proposals for developing the existing system, it is agreed that the methods now practised are preferable to any rigid centralised machinery. In their view such centralised machinery would not facilitate and might even hamper the combination of autonomy and unity which is characteristic of the British Commonwealth and is one of their great achievements."

38. The natural starting-point for future progress in Commonwealth defence has been the idea of regional association. Geography largely decides which problems most directly concern the separate members of the Commonwealth, and it is the aim of the various Governments to recognise and take advantage of this fact by arranging that regional questions shall in the first place be studied in the appropriate regional centre. His Majesty's Government in the United Kingdom have proposed that there should be established in the capital of each of the Dominions United Kingdom liaison officers who could join with the Dominion Chiefs of Staff in studying regional security problems. Similarly they have proposed that Dominion Governments should appoint liaison officers in London. It has been suggested that by this means regional studies can be directed by the Government most immediately concerned with the help of a team of joint advisers. The fruits of these studies can be made available in London, and in the other Dominion capitals, and in this way that measure of co-ordination which is necessary can be secured. The exact method of organising the interchange of liaison officers will depend upon the varying constitutional practice in the different parts of the Commonwealth.

39. These proposals received a favourable hearing at the discussions in London in the spring, and His Majesty's Governments in the Dominions are studying them in detail. There is reason to suppose that in the main they will prove acceptable, and that they will pave the way for machinery which, while giving full play to the independence of the Member States of the Commonwealth, will be effective as a means of consultation and collaboration.

This regional method of organisation will also fit well into any regional schemes evolved under the ægis of the United Nations in which other States will join with members of the Commonwealth in appropriate geographical areas.

40. *Colonial Defence.*—For the defence of the Colonial Empire His Majesty's Government in the United Kingdom is directly responsible. The two main objects to be achieved in this field are, first, the security of the Colonies themselves from external attack and, secondly, the development

of the full resources of the Colonies in the event of war. The security of the Colonies rests mainly upon the maintenance by the Imperial forces of command of the sea and air approaches and of the freedom of the lines of communication between the different parts of the Empire. Plans and preparations for Colonial Defence thus fall (apart from any arrangements for Regional Defence which may be made with the Dominions) within the general scope of the defence measures for which the United Kingdom Government is primarily responsible. It is proposed to revive the Oversea Defence Committee as a sub-committee of the Defence Committee in London, and this body will be charged, as it was before the war, with surveying the whole field of defence preparations in the Colonies and their correlation with the general picture of Imperial Defence. It will also be the duty of this Committee to make sure that full account is taken in Imperial plans of the contribution in men, materials, and facilities which each Colony is capable of making to the general pool in time of war.

VI. CONCLUSION.

41. Such, in outline, is the higher defence organisation which His Majesty's Government have decided to introduce. The changes proposed are based on the experience of the last decade, and are designed to place on a secure foundation and to carry forward into peace the machinery for inter-Service co-operation which worked so smoothly and effectively in war. The Government are satisfied that the functions of the various parts have been defined with sufficient precision to enable the duties to be carried out effectively, while at the same time the organisation as a whole remains sufficiently flexible to allow the process of evolution to continue, as it has throughout this century, so that the central machinery for defence may be progressively adapted to changing needs.

STATEMENT OF THE
FIRST LORD OF THE ADMIRALTY EXPLANATORY
OF THE NAVY ESTIMATES, 1947-48.

(CMD. 7054)

STATEMENT TO ACCOMPANY THE NAVY ESTIMATES, 1947-48.

The provision proposed for the Naval Service during the financial year 1947-48 is £196,700,000. This compares with £275,075,000 provided in the original Estimate for 1946-47 and the Supplementary Estimate of last February, and represents, therefore, a decrease of £78,275,000.

Of the proposed provision for 1947-48, £11,500,000 is required to meet terminal charges which are chiefly payments to men on release leave, compensation for prematurely terminated contracts, final payments on many contracts where detailed settlement has not yet been arranged, and payments on restoring released land and premises. The corresponding figure for terminal charges in 1946-47 was £80,000,000.

Vote A, authorising the number of Officers and Seamen, Boys, Royal Marines and Royal Marine Police to be borne during the year, provided in 1946-47 for a maximum of 492,800 ; the corresponding figure for 1947-48 will be 192,665.

The above figures show broadly how expenditure on the Royal Navy is falling. A more detailed contrast between the two years is not possible within the scope of this paper, since a number of factors which prevent straightforward comparison have to be taken into account. For example, it is intended to resume financial adjustments between Government Departments during the financial year 1947-48, which will add a substantial sum to what would otherwise have been required for the Supply Votes. In addition, there have been some internal adjustments as between the various Navy Votes, such as the concentration of provision for research under Vote 6, and the reversion to civilian manning of ancillary Fleet services. A comparison with pre-war years would be even more difficult.

Considerations which have guided the preparation of these Navy Estimates have been set out for all the Armed Forces of the Crown in the "Statement relating to Defence" (Command 7042).

The fundamental requirement is to provide a Navy sufficiently strong to ensure that our vital lines of supply can be kept open, and to provide such support for the United Nations as may be required, whilst at the same time making the minimum demand on the nation's manpower and material resources. As in the past year, the Royal Navy will, during the financial year 1947-48, be faced by commitments in support of occupation forces in ex-enemy territory and forces required to establish and maintain law and order in other disturbed areas. In addition to the expenditure and effort involved in the winding up of the wartime organisation and bases and the examination and application of the lessons which were learnt in the late war by allied forces, and those which are now coming to light from the records of our late enemies, there is, as is explained more fully in the

attached notes, the desirability of improving conditions of life for serving personnel.

The shortage of men, materials, and money will continue to be a serious factor in all planning. These shortages are most difficult to bear where they affect programmes for new barracks, married quarters, and amenities generally, and better living conditions in the ships themselves. Nevertheless, the provision proposed for the Royal Navy in 1947-48 will allow substantial progress to be made during this period of transition from war to peace, in clearing up the aftermath of the war, in building up a modern and efficient Navy for the future, and in relieving the necessarily austere conditions of recent years.

HALL.

NAVY ESTIMATES, 1947-48: NOTES ON MATTERS OF GENERAL INTEREST, NAVAL ACTIVITIES IN CONNECTION WITH OCCUPIED AND DISTURBED TERRITORIES.

During 1946 the Royal Navy has been required to operate in support of forces of occupation and control in ex-enemy territories and other areas where the restoration of law and order and the maintenance of Allied authority is necessary. Many of these tasks will continue during 1947.

GERMANY.

The strength of the British Naval Force of Occupation in Germany was reduced in 1946 from 7,850 officers and ratings to 1,600, and the number continues to fall as specialised Naval duties are completed. One destroyer is stationed at Kiel and another at Cuxhaven on guard duties and seven small craft are based at Cuxhaven for the supervision of German mine-sweeping operations.

The primary tasks of the Royal Navy in the British Zone of Germany are :

The Liquidation of the German Fleet.

Early in 1946, 116 U-boats were sunk.

The greater part of the remaining ships, which were chiefly minesweepers and auxiliary vessels, had had extensive war service and had reached the end of their useful lives; the balance was allocated to the Allies by the Potsdam decisions. A considerable number of the British share which were not required in the Royal Navy were allocated to our smaller European Allies and have done a good deal of useful work. For example, a number of minesweepers were lent to the Norwegian, Danish, Dutch, and French Navies to assist in mine clearance work and have now been offered as a gift; seven whale catchers, which were used by the Germans as minesweepers, were given to the Norwegian Government to assist in food production, and a netlayer was given to the Danish Government to assist in the removal of German obstructions in Dutch waters.

Most of the remaining small ships of the British allocation were returned to fishing under German management in order to assist the Control Commission to provide food for Germany.

A few submarines, E-boats, minesweepers, and landing craft, depot ships, tugs, auxiliaries, yard craft, an aircraft crane ship and a fleet oiler, have been retained in the Royal Navy, whilst a catapult ship has been

transferred to the R.A.F. and three converted whale catchers to the Ministry of Transport.

The Elimination of Organisations and Establishments supporting the German Fleet.

German Naval personnel have been finally disbanded, but as a temporary measure a small number of skilled ex-German Naval personnel organised in parties of a non-military character are employed in minesweeping, disarmament, and in demolition. Over 150,000 tons of armament stores, including all types of explosives, have been or are being destroyed by dumping or used in the demolition of German coastal defences, anti-aircraft constructions, and other installations of use to the German Navy. Almost all the ports have now been demilitarised and handed over to the Control Commission. The work of destroying the extensive naval installations on Heligoland is still proceeding, but is expected to be completed in 1947.

The Control of German Industry supporting the Fleet.

This work cannot be completed until a decision has been taken on the level of industry to be permitted in Germany, but much has been done during the year which has passed to restrict to safe limits German industries which contributed to the building and maintenance of the Fleet. Particularly important is the demilitarisation of the German mercantile marine so that it may not again form a powerful force capable of providing a source of recruitment and support to the German Navy.

JAPAN.

A squadron of the British Pacific Fleet, including units of the Royal Australian Navy and the Royal Indian Navy, has been based on the port of Kure. The squadron is under the operational control of the Admiral Commanding the Detachment of the U.S. Fleet. The Naval Port Party at Kure, which numbers about 800, is an integral part of the British Commonwealth Occupation Force.

ITALY.

Until the Italian Peace Treaty comes into force, the Commander-in-Chief Mediterranean as Allied Naval C.-in-C. retains operational control of the Italian navy. The Royal Navy has co-operated with United States Naval Forces in support of the forces in Trieste. The Royal Navy personnel have also been engaged in support of Allied land forces in Italy.

THE BALKANS AND GREECE.

On May 15, Albanian shore batteries fired ineffectively at British ships passing on lawful occasions through the North Corfu Channel. While this incident was the subject of diplomatic representations, H.M. Ships *Saumarez* and *Volage* were mined on October 22 in approximately the same position. Brilliant seamanship on the part of the commanding officer of H.M.S. *Volage* enabled both ships to reach harbour safely, but loss of life was unfortunately heavy. The incident is now before the Security Council of the United Nations.

The British Naval Mission has been advising the Greek Government on matters connected with the restoration of the Greek navy and its bases.

Royal Naval parties have also been engaged in Austria and other ex-enemy countries in similar work to that in Germany.

MIDDLE EAST.

The Royal Navy is employed in the Middle East to intercept illegal immigration into Palestine. This work is both delicate and dangerous because of the unseaworthiness and overcrowded condition of the ships engaged in this traffic. Nevertheless, 21 ships carrying approximately 20,000 men, women, and children have been intercepted with only negligible casualties to both sides. The Royal Navy has provided escorts for merchant ships taking the immigrants to Cyprus.

Cairo and Alexandria were cleared of naval stores and installations before being handed over to the Egyptians, so that now only a few men and limited quantities of stores remain in the Canal area.

Indonesia.

FAR EAST.

With the stabilisation of conditions in Indonesia, the naval detachments which operated there during 1946 have been withdrawn.

Singapore and Hong Kong.

The Pacific Fleet is now based on Singapore and Hong Kong instead of Australia, and the restoration of these two bases is proceeding as rapidly as possible. After its recapture Hong Kong was administered by Rear-Admiral Sir Cecil Harcourt until May 1, 1946, when the Civil Power resumed control. A Royal Marine Commando has been doing garrison duty on shore to relieve the Army.

MINESWEEPING.

On the initiative of the Admiralty an international organisation, with Control Board in London, was set up immediately after the cessation of hostilities to supervise the clearance of minefields. In spite of unfavourable weather, 125,000 miles of sea were cleared of mines by 1,900 minesweepers of many nations.

About 180 merchant ships and fishing vessels of all nationalities have been sunk or damaged by mines since May 1945; more than 95 per cent. were vessels sailing outside special channels and areas in spite of published advice. No minesweeper was lost and no casualties were suffered by British personnel in the course of sweeping operations.

At the beginning of 1946, 513 British minesweepers were operating. This number was greatly reduced during 1946 and only 65 were operating at the beginning of 1947. Over 4,600 mines of all types were swept by British and Dominion minesweeping forces in 1946, bringing the total mines swept by British and Dominion forces since the outbreak of war to 34,600.

Waters swept by British flotillas as part of the International Organisation included dangerous areas around the coast of the British Isles, various minefields in the North Sea, Denmark Strait, and the Channel between the Faroes and Iceland, and minefields at the exits of the Mediterranean on the North African coast, in the Sicilian Channel, and the Adriatic. In the Pacific the approaches to Hong Kong and Singapore have been cleared and flotillas operating many hundreds of miles from their bases have cleared the south coast of Indo-China, the east coast of Malaya, and off North

Borneo, and have swept fields off the Burma coast and the Andaman and Nicobar Islands.

Apart from the two small areas in and off the Thames estuary and the Wash which remain dangerous to shipping and many small fields containing deep mines off southern Ireland and the north-west coast of Scotland, the coasts around the British Isles are now clear. Except in the Mediterranean none of the other fields throughout the world which are British responsibility interfere with shipping.

DEMobilISATION IN THE NAVY.

The release of personnel from the Navy has proceeded satisfactorily and in general smoothly, despite the necessary re-deployment of a navy which had been specifically organised to fight the war in the Pacific. The altered manning requirements created, as the Navy reduced in size, smaller redundancies of personnel in some branches than in others, and particularly in the Seamen and Stoker branches. It has, in consequence, been necessary to release some rating categories' Age and Service Groups well in advance of the general level of releases and at the same time to hold back other rating categories behind the general level of releases. At the present time the disparity between the most advanced and the most retarded group is 11 groups. Exact equality of releases cannot be achieved before December 1948, by which date all men entered on "Hostilities Only" engagements before January 1, 1947, will have been released. The necessity for this uneven release programme has been well understood by the personnel of the Fleet.

The demobilisation of officers from the Royal Navy is now almost complete. Those still serving are regular officers or officers who have volunteered to serve until the end of the emergency or on extended service engagements.

Not more than 35,000 men entered before VE-Day remain to be released under the demobilisation plan. On the other hand, since that date some 75,000 men have been entered.

There will for some years be a shortage of trained and experienced ratings in the Leading and Able rates. The Royal Navy will therefore provide for some time to come exceptional opportunity of advancement to boys and youths who volunteer for service on regular engagements.

TRANSPORT.

Assistance to the depleted merchant navies of the allied nations has been afforded during the year by the extensive use of H.M. vessels on trooping duties and in the transport of civilians, stores, and food. Sixty-one voyages were made during the year by major units of the Fleet (aircraft carriers and cruisers) with an aggregate steaming distance of over one million miles, an average of 57,000 miles for each vessel.

DISPOSAL OF SURPLUS SHIPS AND STORES. DE-REQUISITIONING OF PREMISES.

Steady progress has been made in the disposal of surplus ships and stores and in the release of properties held by the Admiralty on requisition.

In general the responsibility for the disposal of surplus naval stores has not rested with the Admiralty but with the Ministry of Supply or other appropriate Government Department. For ships and small craft (with

the exception of commercial vessels, including tugs and barges) the Admiralty has been the responsible disposal authority and up to November 80, 1946, the following major disposals had been arranged in this category :

War vessels and landing craft disposed of for				
commercial use	..	..	..	£1,500,000
Trawlers and drifters	..	..	..	£2,350,000
Other small craft	..	..	..	£2,500,000

In addition, warships surplus to the requirements of the Fleet have been transferred to the Dominions and to foreign powers by gift, loan, or charter. A full list of these transfers was published in the official report of Parliamentary Debates in the House of Lords for January 29, 1947.

With the exception of two craft which had been extensively fitted out for special purposes and still remain in naval service, all fishing vessels previously held on requisition have now been released, including 606 trawlers, 272 motor fishing vessels, 403 drifters, and 457 vessels of foreign ownership. In addition to the release of these requisitioned craft, 202 Government-owned trawlers and drifters have been freed from naval service, 190 of which are now engaged in commercial fishing or are being fitted out for this work by their owners. A large number of Admiralty-owned motor fishing vessels has also been released.

The fleet of 4,500 merchant craft which was employed on naval service throughout the world in 1945 has been dispersed and the return to civilian life of the personnel engaged under T.124 and similar agreements is now almost complete.

The disposal of ship fittings has been carried out by the Admiralty. Good progress has been made, but disposals are unlikely to be completed during the forthcoming year.

The surplus materials and goods arising as the result of cancelled contracts have been an important source of revenue. The greater part of these surpluses have been in the form of materials and scrap, which have been disposed of by the Ministry of Supply as the responsible authority. Other items have been transferred with appropriate financial adjustment to private accounts for completion or private sale.

The cumulative total value of Admiralty disposals up to January 31, 1947, was approximately £15,000,000.

By the end of 1946 approximately 80 per cent. of the total holdings of non-industrial property held on requisition by the Admiralty at the beginning of 1945 had been released. By the same date 19½ million square feet, representing 87½ per cent. of the 22 million square feet of industrial accommodation held at the beginning of 1945, had likewise been released. Further progress in the release of both non-industrial and industrial property held on requisition is being made and it is expected that the programme will be completed by the end of this year.

The settlement of claims for the rehabilitation of damage sustained during the period of requisitioning has been retarded by the unavoidable loss of professional staff on return to civilian life, notwithstanding the employment in some instances of private firms.

DISPOSITION OF THE FLEET, BASES, AND DEPOTS.

Steady progress has been made in the redistribution of the Fleet to its peace-time stations. Temporary bases and accumulations of stores

throughout the world are in various stages of reduction, but in general the process is nearing completion. It is not yet possible to describe in detail where units of the Fleet will be stationed in the years to come because many factors bearing on such dispositions are still to be determined, principally the responsibilities which the United Kingdom and the British Commonwealth may be called upon to bear under the United Nations.

In Home Waters units of the Fleet have been reconstituted. H.M. ships are in active commission for normal fleet purposes, including an extensive training programme. All Naval Authorities have now been withdrawn from commercial ports in the United Kingdom and naval base facilities are, with few exceptions, confined to the main home ports. Full use is still being made of training establishments at Londonderry and on the Clyde, and minesweeping operations from Queenborough continue.

Abroad, the disposition of units of the Fleet and the allocation of reserves is, in general, on familiar pre-war lines. The naval bases in Australia, the Middle East, and other areas have in most cases been closed down or have reverted to normal peace-time footing, functions being transferred, as appropriate, to the peace-time stations at Singapore, Hong Kong, Ceylon, Malta, South Africa, and the West Indies.

While commitments in connection with Combined Operations have been extensively reduced, the work of instruction, training, and development continues to consolidate the knowledge and experience gained during the last war.

In order to minimise the calls on manpower, money, land, and buildings, naval commitments have everywhere been extensively reduced and all expedients for effecting economies have been adopted. The demands on shore accommodation made by a heavy training programme have been substantially reduced by the use of reserve ships, notably the capital ships *Valiant*, *Resolution*, and *Revenge*, as training barracks and as mechanical training establishments.

The Reserve Fleet has been reconstituted and in addition to forming reserves against emergencies as in pre-war years, the vessels which comprise the Reserve Fleet will take their place in the Fleet when ships in active commission are refitted.

A start has been made on the overhaul and refitting, necessarily required after long and arduous war service, of ships in reserve which are known as likely to be required for the post-war Fleet. In addition, and with the view to reducing to the minimum the manpower required for the maintenance of the Reserve Fleet, active measures are being taken to the limit of resources available to prevent deterioration, for example, by the use of protective paints and desiccants. Research has been undertaken with satisfactory results into the designing of resilient moorings, which by their elasticity provide an increased safety.

FISHERY PROTECTION.

The past year has seen the reconstitution of the Fishery Protection Flotilla, which now comprises one modern sloop and seven "Algerine" class minesweepers. Two motor launches, specially equipped, operate off the south-east coast of England to prevent poaching. In addition to the normal functions of protecting the rights of British fishing vessels and of assisting fishing vessels generally, the ships of the flotilla have been occupied in guiding fishing vessels from areas which are still dangerous from the

presence of mines. Vessels have from time to time been placed at the disposal of the Ministry of Agriculture and Fisheries and the Scottish Home Department for scientific investigation into the possibility of contacting shoals of fish with modern submarine detectors. Distant patrols have been carried out to Iceland, Norway, and Denmark to re-establish liaison on fishery protection matters. After a lapse of seven years, the vessels have received warm welcome at all ports they have visited.

ALLIED NAVIES.

It has continued to be Admiralty policy to strengthen the ties between the Royal Navy and the navies of Allied Powers which developed during the war. Assistance has been afforded by the transfer of ships, the supply of equipment and stores, the training and instruction of personnel, and the provision of technical and tactical information.

Financial gain has accrued from the transfer to other Powers of war-ships surplus to the requirements of the Royal Navy, but the primary consideration has been to strengthen close war-time relationships and to assist the Powers concerned in forming the nuclei of balanced modern navies which will be able to play, in co-operation with the Royal Navy, whatever part in guaranteeing the future security of the world the United Nations may call upon them to perform. In many instances the foreign governments concerned have purchased those ships which served them so well during the war.

NAVAL AVIATION.

The years of war saw an extensive increase in naval aviation, and the Fleet Air Arm, as it was previously known, is now an integral part of the Royal Navy. One man in four in the Royal Navy is directly concerned or closely associated with naval aviation at the present day. The aircraft carrier is now second to none among the fighting ships of the Royal Navy and the importance of this class of vessel is duly reflected in the Programmes of Construction which are now maturing and are yet to mature.

A review of the personnel requirements of naval aviation, in the light of the experience gained during the war years, has resulted already in re-organisations of manning arrangements which will lead to further changes in due course. A notable change is reflected in the new system under which most of the pilots will be ratings and a further modification which will shortly be introduced will be the re-introduction of a Naval Airman Branch, embracing all ratings engaged on the non-skilled servicing of aircraft, and photographers and meteorological observers.

From force of circumstances reliance had to be placed to a large extent during the recent war on American aircraft and material. A complete change has therefore to be made in basic equipment for naval aviation, irrespective of the advances being made in aeronautical techniques generally. Good progress has been made with re-equipment and research into other items is in an advanced stage. Provision for naval aviation accordingly features large in the total financial provision for the Royal Navy proposed for 1947-48.

In conjunction with the Royal Air Force and the civil aviation authorities, plans for airfields both at home and abroad have been receiving consideration. With the reduction in operational commitments, a number of airfields have been released for agricultural and other peace-time purposes and the year has, for the most part, been one of contraction.

NEW CONSTRUCTION PROGRAMME AND PRODUCTION WORK FOR THE NAVY.

For the present it is contemplated that naval construction will continue, with certain exceptions of a limited and experimental character for which a token sum has been included in the Estimates, to be confined to the completion of ships building where such a course is economical and the vessels are required for the Fleet of the future. As a corollary, cancellations and scrapping of part-built vessels of previous New Construction programmes have continued during 1946-47. Major units completed during the year are:

Battleship	..	..	Vanguard.
Light Fleet Carrier	..	..	Triumph.
Destroyers	..	..	Chivalrous, Comus, Concord, Crispin, Creole, Cromwell, Saintes, Cadiz, St. James, Sluys, Vigo, Gravelines, Gabbard, Aisne, Barrosa, Dunkirk.
Submarines	..	..	Teredo, Tabard, Aurochs, Aeneas, Alaric, Alcide, Aldernay, Affray.
Sloops	..	..	Snipe, Sparrow, Acteon, Nereide.
Frigate	..	..	Loch Veyatie.
Despatch Vessels	..	..	Surprise, Alert.

The most important launching was that of the aircraft carrier *Eagle*. Refits and adaptations carried out during the year have included the conversion of *Revenge* and *Resolution* to training ships, and the fitting out of *Devonshire* as a training cruiser for cadets. In addition to financial stringency, lack of men and materials has limited the work of new construction, refitting, and modernisation.

Despite limitations, development work continues both in the experimental and production fields of welding, and progress has been made in improving fire-resisting qualities of ships' fittings. Work on the improvement of steam machinery by the use of high pressure and temperature is proceeding through the medium of engineering concerns in this country. New types of boilers and associated equipment are being developed, and efforts are being made to increase the accuracy of large marine reduction gears. Gas turbines are under investigation. Continuing attention is being given to the performance and development of internal combustion engines of all types, up to those suitable for ship propulsion. In the light of war experience standardisation is being extended wherever practicable and improvements are being made to the organisation for the supply of spare parts. Further progress will be made in these two directions as money and materials become obtainable.

MERCHANT SHIPBUILDING.

Early in 1940 the Admiralty was entrusted with the responsibility for all merchant shipbuilding and repairs. Placing of Government orders for merchant ships ceased at VE-Day, and by that date orders had been placed on Government account for some 1,700 ships at a total estimated cost of £173,000,000. This heavy programme has been very nearly completed, but a small residue of expenditure still remains to be borne on Navy Votes in 1947-48.

The Admiralty continues to be represented on the Shipbuilding Advisory Committee which was set up last year to advise His Majesty's Government on all matters affecting the industry, its efficiency, and its stability.

WORKS PROGRAMME FOR 1947-48.

In common with the rest of the country, Admiralty property has suffered severely during the last few years from lack of adequate maintenance and from extensive war damage. Substantial provision has therefore been made towards making good these heavy arrears of maintenance, but satisfactory progress cannot be achieved for some time to come. The repair of war damage will be an even longer task, not only because of its great extent but because the damage is heaviest in those areas where the labour shortage is most acute, particularly Plymouth and Portsmouth. Provision has been made for a substantial work of reconstruction at Malta and for rehabilitation at both Singapore and Hong Kong. At Devonport, Portsmouth, and Malta Dockyards it is intended to use the opportunity afforded by the war-time destruction to replan the yards on modern lines.

Apart from the necessity of making good facilities which existed before the war, the Naval Works Programme is affected by the following considerations :

- (i) The Government decision that married quarters shall be provided for naval personnel serving abroad and at remote stations at home.
- (ii) The fact that, owing to technical developments during the war, a greater part of the Navy than before the war will in future be accommodated on shore.
- (iii) The need to improve the standards of accommodation of service personnel ashore, much of the accommodation provided during the war being built in temporary construction and many of the pre-war establishments requiring modernisation.

The expansion of naval aviation necessitated the construction of a large number of aerodromes. In many cases the living accommodation was similarly built during the war in temporary construction and does not conform with peace-time standards.

The war demonstrated the importance of keeping abreast of modern scientific achievement in its application to naval warfare. The laboratory, etc., facilities for scientific staffs which existed before the war are no longer sufficient for the purpose and a substantial proportion of research and development work is now being carried out in requisitioned and unsuitable premises. A start is accordingly being made with the provision of new buildings for these services.

The damage sustained during the war by storage accommodation for victualling and naval stores was proportionately heavy, and requisitioned premises have been in use for these services. This accommodation is, however, being surrendered as quickly as possible and expedients are being adopted to accommodate stores until it is possible to progress further the necessary extensive programme of replacement on which a start is now being made.

ADMIRALTY SHORE ESTABLISHMENTS.

The civilian labour force has been reduced to 110,000, and a further fall in numbers may be expected to take place during the coming year.

With the view to avoiding dispersal of skilled labour detrimental to the expansion required in the event of a future emergency, the Admiralty has undertaken a certain amount of work on a commercial basis in the Royal Dockyards and shore establishments.

INTER-SERVICE AND INTER-DEPARTMENTAL.

Close attention continues to be paid to the integration of the Admiralty organisation with the wider framework of the defence arrangements for the country as a whole, which developed during the war. In particular, re-adjustment of Admiralty departments and methods proceed with due regard to the desirability of the closest possible inter-service and inter-departmental relations.

SCIENTIFIC RESEARCH AND DEVELOPMENT.

Within the limits of resources available, financial and otherwise, priority continues to be given to the work of scientific research and development and steady progress is being made in the building up of the Royal Naval Scientific Service. The prior claims at the present time of the Universities, schools, and industry for scientific personnel will, however, necessarily limit the progress that can be made in this direction for some time to come.

Reference has already been made to the provision of adequate laboratory, etc., facilities.

HYDROGRAPHY AND METEOROLOGY.

The R.N. Surveying Service and the Hydrographic Department of the Admiralty were employed during the war almost entirely on operational requirements, and the work for shipping interests generally had, of necessity, to be strictly limited. Five surveying ships and six launches will, however, now be resuming the peace-time work of charting the seas. Three of the vessels and the launches will operate in the waters off the British Isles, charting wrecks and surveying once more the approaches to the ports. One vessel will operate in the Near East and one off Borneo, where the opening up of new harbours for oil and timber is a matter of urgency and importance.

A start has been made with the compilation of special charts to meet requirements of radio navigation. Agencies for the sale of Admiralty charts have been reopened in countries which were occupied by the enemy, and owing to the accumulated post-war needs of merchant shipping, sales of charts have reached an unusually high level.

THE ROYAL OBSERVATORY, GREENWICH.

Owing to the growth of London, astronomical observations from Greenwich have become increasingly restricted on account of the impurity of the atmosphere and the brightness of the sky at night, and the need for removing the Royal Observatory from the London area, recognised some years before the war, has now become essential. Hurstmonceux Castle was selected after consultation with the Board of Visitors as the most suitable of a number of possible sites, and the transfer of the Observatory will begin during 1947; necessary preparatory works are now in hand. All additions and developments will be made with due respect for the historic structure. The future of the present Observatory building, which was built by Sir Christopher Wren in 1675, is under consideration.

On the recommendation of the Royal Society, His Majesty's Government have decided to provide a 100-inch telescope for use by British astronomers generally. The telescope will be sited in the grounds of Hurstmonceux Castle, in a special building to be called the Isaac Newton

Observatory in commemoration of the tercentenary of the great scientist and mathematician, which was celebrated last year. It is estimated that the capital cost of the instrument and building, which will be spread over a number of years, will be about £250,000; the expenditure will be met from naval funds in the first instance, but one-half will be repaid by way of a grant-in-aid from the Treasury Scientific Investigations Vote. The sum of £5,000 has been provided in the Navy Estimates for 1947-48 to cover preliminary research work.

ADMIRALTY OFFICE.

DEATH OF SIR HENRY MARKHAM, K.C.B., M.C.

The Board of Admiralty and the Royal Navy suffered a severe loss on December 14, 1946, in the death of Sir Henry Markham, K.C.B., M.C., who had been Secretary of the Admiralty and a Lord Commissioner of the Admiralty from December 5, 1940. Through the arduous years of the war and immediately afterwards he bore the great responsibilities of his office with a conspicuous ability and devotion which were reflected in his unique contribution to the administration of the naval service during this critical period.

The exigencies of war necessitated a large increase in the Admiralty Office. At the outset of the last financial year for which full estimates were presented, that is 1939-40, the total staff borne at Headquarters was 4,750. A year later it had nearly doubled. Thereafter it continued to rise steadily until 1943, after which the rate of increase slackened. The total number of naval and civilian staff borne at Headquarters reached its peak (22,600) in the spring of 1945, since when it has fallen, slowly at first, but since September 1945 much more rapidly. At the end of 1946 the numbers borne had declined by over 7,000 from the peak total reached.

In considering these figures it must be borne in mind that during the recent war, as in 1914-18, the Admiralty continued to be both a major production Department and the administrative Headquarters of the Royal Navy. It was also, more than in the war of 1914-18, an operational Headquarters and a centre of communication, and at the same time naval warfare, in almost every field, technical, tactical, and administrative, attained a complexity which hitherto has been unapproached.

The rise in numbers borne at Headquarters after the Normandy landing arose principally from two causes. First, special preparations had to be made on a large scale for the transfer of the main war effort to the Far East, and secondly, measures were instituted for the re-allocation of manpower and investigation of the more pressing of reconstruction problems.

The numbers borne at Headquarters will continue to be reduced as rapidly as possible. The rate of reduction which can safely be achieved is, however, limited by several factors, in particular, the work of clearing up, both physical and financial, which is still outstanding, the comprehensive and far-reaching measures of reorganisation which war experience has shown to be necessary, and the continued expansion of effort required in the field of scientific research and development.

RECRUITMENT OF PERSONNEL.

Recruitment for long-service engagements has in general been satisfactory, but the deficiencies arising from the virtual cessation of regular

entries during six years of war have not been wholly covered by the re-allocation of short-service men to the various categories concerned.

PAY AND PENSIONS.

During the year there have been notable changes in the arrangements for Service Pay and Pensions. The New Pay Code was introduced with effect from July 1, 1946, and the arrangements are in general satisfactory. Some adjustments and improvements have been made to the scheme as outlined in Command 6715 and special attention is being given to its full and efficient development.

Review of the Pension Codes of the three Services was undertaken with the view to their alignment as far as might be possible and a new and simplified code was introduced during the course of the year.

WELFARE.

Comment has been made on the improvements of Service pay reflected in the New Pay Code. Conditions of service have been improved in a number of other directions notwithstanding the manpower difficulties arising from the rapid demobilisation which has taken place.

Leave standards now approximate to those in force before the war. Present standards allow 42 days leave per annum to personnel stationed at home. For each year spent abroad as foreign service, personnel are allowed 14 days foreign service leave on return to this country. It is hoped to increase the scale of foreign service leave in the near future. These scales apply to officers and men alike.

Conditions in a fighting ship, and in particular the large number of personnel required to man and maintain the complex armament, machinery, and electrical and other equipment which the present day warship has to carry, involve the acceptance of living spaces more restricted than would be the case on shore. The return of peace conditions, however, has itself permitted amelioration of the exceptionally crowded conditions which obtained afloat during the war. In addition, the living conditions afloat are being improved, for example, by better messing accommodation, ventilation, etc., and provision of general amenities.

The Family Welfare work continues.

ROYAL MARINES.

The Corps of Royal Marines will in future continue to carry out their traditional functions afloat and ashore, and, in addition, will provide and train the permanent peace-time amphibious Commando units, both for operational tasks and for experimental purposes. These arrangements, representing a development of war-time experience, will include the manning of minor landing craft and the provision of gun crews for major support craft.

During the year a Bill was enacted making provision for the extension of the period of re-enlistment, together with the period of first enlistment, of Royal Marines from 21 years to 22 years, thus bringing the periods of service of the Royal Marines into line with those for the Royal Navy.

WOMEN'S ROYAL NAVY SERVICE.

The last financial year has been one of steady reduction of W.R.N.S. personnel, but a decision has been reached to establish a W.R.N.S. on a

permanent peace-time footing. The strength of the Service will approach 10,000 at the end of the forthcoming financial year.

A few W.R.N.S. personnel are serving overseas, and in Malta and North-west Germany only.

NATIONAL SERVICE AND RESERVES.

The decision to continue National Service ensures that expansion of the Royal Navy in a future emergency will be less difficult than hitherto, but manning requirements will not be entirely met by this measure alone. A period of 18 months' service cannot qualify a man for the higher or more skilled rates. National Service men can fill complement billets in the Fleet only after their initial training is finished, and even then only to an extent that is limited. In the short time that will then be available, it will not be possible normally to draft them to foreign stations. For the peace-time personnel of the Navy reliance must therefore be placed to a large extent on regular entries, but even so a gap will still remain between the manpower required in an emergency and the men serving on long-term engagements who can immediately fill the more important billets. Reserve organisations on lines similar to those in existence prior to the war will therefore be required.

The decision to reconstitute the pre-war R.N.V.R. Divisions, with the addition of one at Cardiff and the separation of the Forth and Tay elements, has already been announced. The future duties of the Royal Naval Volunteer Reserve and the relations between this Reserve and the other Naval Reserves, having regard to the continuation of National Service, are under comprehensive review. The decisions reached will be announced in due course.

MISCELLANEOUS.

Events of interest during the Naval year that has passed are :

(a) First and foremost has been the Royal Cruise in H.M.S. Vanguard to South Africa. The booklet published deals very fully with this important event and describes the new battleship.

(b) H.R.H. Princess Elizabeth visited Belfast for the launching of the aircraft carrier Eagle in March. The passages between Greenock and Belfast were made in H.M.S. Superb.

(c) Showing the flag and special visits of squadrons and ships are once more taking place all over the world. Important visits have been those of the Home Fleet to Lisbon, the visit of Admiral Lord Fraser of North Cape in H.M.S. Triumph escorted by H.M.S. Rapid to Kronstadt in connection with the Red Navy Day celebrations, the attendance of H.M.S. Bellona and two destroyers at Narvik for ceremonies on the anniversary of the battle, and the visits of the new cruiser H.M.S. Superb to Antwerp on the occasion of the English Week organised by the British Council.

(d) Victory celebrations were focused in the great parade in London where contingents from Dominion, Colonial, and Allied Navies were welcomed to this country and the Royal Naval contingents featured prominently. During June ships of the Home Fleet and local flotillas visited ports throughout England, Scotland, Wales, and Northern Ireland for local victory celebrations, both large and small.

(e) During the fuel crisis a number of submarines have been employed at the dockyard ports as auxiliary power stations.

NAVY ESTIMATES,

ABSTRACT OF NAVY

Page	Vote	Service	Estimates 1947-48		
			Gross Estimate	Appropriations in Aid	Net Estimate
8	A {	Number of Officers, Seamen, Boys and Royal Marines	191,000	—	<i>Maximum Numbers</i> 191,000
		Number of Royal Marine Police	1,665	—	1,665
10	1	Wages, etc., of Officers and Men of the Royal Navy and Royal Marines, and Women's Royal Naval Service	£ 42,717,000	£ 250,000	£ 42,467,000
16	2	Victualling and Clothing for the Navy	19,466,700	5,295,700	14,171,000
24	3	Medical Establishments and Services	1,735,900	55,900	1,680,000
32	4	Civilians Employed on Fleet Services	4,659,600	4,600	4,655,000
36	5	Educational Services	732,800	98,600	634,000
52	6	Scientific Services	6,453,550	268,550	6,185,000
72	7	Royal Naval Reserves	575,100	100	575,000
80	8	Shipbuilding, Repairs, Maintenance, etc.			
		Section I.—Personnel	24,756,400	435,400	24,321,000
		Section II.—Matériel	26,794,000	6,300,000	20,494,000
		Section III.—Contract Work	33,736,000	3,444,000	30,292,000
110	9	Naval Armaments	13,416,500	771,500	12,645,000
126	10	Works, Buildings, and Repairs at Home and Abroad	10,650,000	400,000	10,250,000
140	11	Miscellaneous Effective Services	9,627,025	1,274,025	8,353,000
152	12	Admiralty Office	4,561,800	14,800	4,547,000
188	13	Non-Effective Services (b)	13,785,825	20,825	13,765,000
204	14	Merchant Shipbuilding, etc. (c)	1,756,000	90,000	1,666,000
Total			215,424,000	18,724,000	196,700,000

(a) Exclusive of Supplementary Estimate of £20,000,000 (H.C. 42/1946-47).

(b) Vote 13 for 1947-48 includes all the services provided for in the 1946-47 Estimates under Votes 13, Non-Gratuities. The total only of these three Votes has been shown in the above Abstract for 1946-47, and has been

(c) This was Vote 16 in 1946-47.

Admiralty.
19th February, 1947 }

HALL
J. H. D. CUNNINGHAM

ARTHUR J. POWER
C. S. DANIEL

1947-48.

ESTIMATES FOR 1947-48.

Estimates 1946-47 (a)			Difference on Net Estimates		Vote
Gross Estimate	Appropriations in Aid	Net Estimate	Increase	Decrease	
		<i>Maximum Numbers</i>			
490,000	—	490,000	—	299,000	A
2,800	—	2,800	—	1,135	
£ 87,729,000	£ 439,000	£ 87,290,000	£ —	£ 44,823,000	1
26,335,800	6,700,800	19,635,000	—	5,464,000	2
1,970,200	81,200	1,889,000	—	209,000	3
2,479,000	4,000	2,475,000	2,180,000	—	4
511,500	92,500	419,000	215,000	—	5
4,925,000	131,000	4,794,000	1,391,000	—	6
360,100	100	360,000	215,000	—	7
23,810,900	215,900	23,595,000	726,000	—	Sec. I
30,876,000	2,250,000	28,626,000	—	8,132,000	Sec. II
33,255,700	980,700	32,275,000	—	1,983,000	Sec. III
10,408,000	500,000	9,908,000	2,737,000	—	9
10,100,000	550,000	9,550,000	700,000	—	10
13,310,000	1,060,000	12,250,000	—	3,897,000	11
4,951,000	10,000	4,941,000	—	394,000	12
11,726,400	22,400	11,704,000 (b)	2,061,000	—	13
5,624,500	260,500	5,364,000 (c)	—	3,698,000	14
268,373,100	13,298,100	255,075,000 (a)	10,225,000	68,600,000	
Net Decrease			£58,375,000		

effective Services—Officers, 14, Non-effective Services—Men, and 15, Civil Superannuation, Allowances and placed against Vote 13.

DOUGLAS FISHER
PHILIP VIAN

R. McGRIGOR
R. D. OLIVER

JOHN DUGDALE
WALTER J. EDWARDS
J. G. LANG

SUMMARY OF STATEMENT SHOWING RATES OF PAY AND ALLOWANCES OF OFFICERS AND MEN OF THE ROYAL NAVY AND ROYAL MARINES.

(Extracted from Navy Estimates, 1947-48, Appendix I.)

PAY—OFFICERS.

EXECUTIVE, AIR, ENGINEERING, ELECTRICAL, SUPPLY AND SECRETARIAT,
ORDNANCE AND SPECIAL BRANCHES (GENERAL LIST OFFICERS), R.N.,
R.N.R., AND R.N.V.R.

										<i>Daily Rate</i>		
										£	s.	d.
Cadet in Training Ship	..	..	..	..	..	..	..	..	..	2	6	
Cadet in Ship of the Fleet	..	..	..	..	..	..	..	..	..	5	0	
Midshipman	..	..	..	..	..	..	..	..	..	7	6	
Acting Sub-Lieutenant	..	..	..	..	..	..	..	..	..	11	0	
Sub-Lieutenant	..	..	..	..	..	..	..	..	..	13	0	
Lieutenant on promotion	..	..	..	..	..	..	..	..	..	17	0	
„ after 2 years	..	..	..	..	..	..	..	..	..	19	0	
„ „ 4 „	..	..	..	..	..	..	..	..	..	1	4	0
„ „ 6 „	..	..	..	..	..	..	..	..	..	1	6	0
Lieutenant-Commander on promotion	..	..	..	..	..	..	..	..	..	1	12	0
„ „ after 2 years	..	..	..	..	..	..	..	..	..	1	14	0
„ „ 4 „	..	..	..	..	..	..	..	..	..	1	16	0
„ „ 6 „	..	..	..	..	..	..	..	..	..	1	18	0
„ „ 8 „	..	..	..	..	..	..	..	..	..	2	0	0
„ „ 10 „	..	..	..	..	..	..	..	..	..	2	2	0
Commander on promotion	..	..	..	..	..	..	..	..	..	2	7	6
„ after 2 years	..	..	..	..	..	..	..	..	..	2	10	0
„ „ 4 „	..	..	..	..	..	..	..	..	..	2	12	6
„ „ 6 „	..	..	..	..	..	..	..	..	..	2	15	0
„ „ 8 „	..	..	..	..	..	..	..	..	..	2	17	6
Captain on promotion	..	..	..	..	..	..	..	..	..	3	5	0
„ after 2 years	..	..	..	..	..	..	..	..	..	3	8	0
„ „ 4 „	..	..	..	..	..	..	..	..	..	3	11	0
„ „ 6 „	..	..	..	..	..	..	..	..	..	3	14	0
„ „ 8 „	..	..	..	..	..	..	..	..	..	3	17	0
Rear-Admiral	..	..	..	..	..	..	..	..	..	5	10	0
Commodore 1st Class	..	..	..	..	..	..	..	..	..
Vice-Admiral	..	..	..	..	..	..	..	..	..	6	15	0
Admiral	..	..	..	..	..	..	..	..	..	8	0	0
Admiral of the Fleet	..	..	..	..	..	..	..	..	..	9	0	0

Note.—A Commodore 2nd Class receives pay as a Captain.

MEDICAL OFFICERS, R.N., AND R.N.V.R.

										<i>Daily Rate</i>		
										£	s.	d.
Acting Surgeon Lieutenant	..	..	..	..	..	..	..	..	..	1	2	0
Surgeon Lieutenant, on confirmation after 1 year from date of entry	..	..	..	..	..	..	..	..	..	1	8	0
„ „ at 2 years' seniority	..	..	..	..	..	..	..	..	..	1	11	0
„ „ 4 „	..	..	..	..	..	..	..	..	..	1	14	0
„ „ 6 „	..	..	..	..	..	..	..	..	..	1	17	0
Surgeon Lieutenant-Commander on promotion	..	..	..	..	..	..	..	..	..	2	3	0
„ „ after 2 years	..	..	..	..	..	..	..	..	..	2	6	0
„ „ 4 „	..	..	..	..	..	..	..	..	..	2	9	0
„ „ 6 „	..	..	..	..	..	..	..	..	..	2	12	0
Surgeon Commander on promotion	..	..	..	..	..	..	..	..	..	2	18	0
„ „ after 2 years	..	..	..	..	..	..	..	..	..	3	1	0
„ „ 4 „	..	..	..	..	..	..	..	..	..	3	4	0
„ „ 6 „	..	..	..	..	..	..	..	..	..	3	7	0
„ „ 8 „	..	..	..	..	..	..	..	..	..	3	10	0
Surgeon Captain on promotion	..	..	..	..	..	..	..	..	..	3	15	0
„ „ after 2 years	..	..	..	..	..	..	..	..	..	3	18	0

MEDICAL OFFICERS, R.N., AND R.N.V.R.—*continued.*

										<i>Daily Rate</i>		
										£	s.	d.
Surgeon Captain after 4 years	..	..	..	..	..	..	..	..	..	4	1	0
" " " 6 "	..	..	..	..	..	..	..	..	..	4	4	0
" " " 8 "	..	..	..	..	..	..	..	..	..	4	7	0
Surgeon Rear-Admiral	..	..	..	..	..	..	..	..	..	5	10	0
Surgeon Vice-Admiral	..	..	..	..	..	..	..	..	..	6	15	0

DENTAL OFFICERS, R.N., AND R.N.V.R.

										<i>Daily Rate</i>		
										£	s.	d.
Action Surgeon Lieutenant (D)	..	..	..	..	..	..	..	..	..	1	0	0
Surgeon Lieutenant (D), on confirmation after 1 year from date of entry	..	..	..	..	..	..	..	..	..	1	5	0
" " " at 2 years' seniority	..	..	..	..	..	..	..	..	..	1	8	0
" " " 4 "	..	..	..	..	..	..	..	..	..	1	11	0
" " " 6 "	..	..	..	..	..	..	..	..	..	1	14	0
Surgeon Lieutenant-Commander (D) on promotion	..	..	..	..	..	..	..	..	..	2	0	0
" " " after 2 years	..	..	..	..	..	..	..	..	..	2	3	0
" " " 4 "	..	..	..	..	..	..	..	..	..	2	6	0
" " " 6 "	..	..	..	..	..	..	..	..	..	2	9	0
Surgeon Commander (D) on promotion	..	..	..	..	..	..	..	..	..	2	15	0
" " " after 2 years	..	..	..	..	..	..	..	..	..	2	18	0
" " " 4 "	..	..	..	..	..	..	..	..	..	3	1	0
" " " 6 "	..	..	..	..	..	..	..	..	..	3	4	0
" " " 8 "	..	..	..	..	..	..	..	..	..	3	7	0
Surgeon Captain (D) on promotion	..	..	..	..	..	..	..	..	..	3	12	0
" " " after 2 years	..	..	..	..	..	..	..	..	..	3	15	0
" " " 4 "	..	..	..	..	..	..	..	..	..	3	18	0
" " " 6 "	..	..	..	..	..	..	..	..	..	4	1	0
" " " 8 "	..	..	..	..	..	..	..	..	..	4	4	0

CHAPLAINS (ALL DENOMINATIONS), R.N., AND R.N.V.R.

										<i>Daily Rate</i>		
										£	s.	d.
Chaplain on entry	..	..	..	..	..	..	..	..	..	1	2	6
" after 2 years	..	..	..	..	..	..	..	..	..	1	5	0
" " 4 "	..	..	..	..	..	..	..	..	..	1	7	6
" " 6 "	..	..	..	..	..	..	..	..	..	1	10	0
" " 8 "	..	..	..	..	..	..	..	..	..	1	12	6
" " 10 "	..	..	..	..	..	..	..	..	..	1	15	0
" " 12 "	..	..	..	..	..	..	..	..	..	1	17	6
" " 14 "	..	..	..	..	..	..	..	..	..	2	0	0
" " 16 "	..	..	..	..	..	..	..	..	..	2	2	6
" " 18 "	..	..	..	..	..	..	..	..	..	2	5	0
" " 20 "	..	..	..	..	..	..	..	..	..	2	7	6
" " 22 "	..	..	..	..	..	..	..	..	..	2	10	0
" " 24 "	..	..	..	..	..	..	..	..	..	2	12	6
" " 26 "	..	..	..	..	..	..	..	..	..	2	15	0
Chaplain of the Fleet	..	..	..	..	..	..	..	..	..	3	10	0

EDUCATION OFFICERS, R.N.

										<i>Daily Rate</i>		
										£	s.	d.
Instructor Sub-Lieutenant	..	..	..	..	..	..	..	..	..	13	0	
Acting Instructor Lieutenant	..	..	..	..	..	..	..	..	..	17	0	
Instructor Lieutenant on promotion	..	..	..	..	..	..	..	..	..	19	0	
" " " at years' seniority	..	..	..	..	..	..	..	..	..	1	4	0
" " " 4 "	..	..	..	..	..	..	..	..	..	1	6	0
" " " 6 "	..	..	..	..	..	..	..	..	..	1	8	0
" " " 8 "	..	..	..	..	..	..	..	..	..	1	10	0
" " " 10 "	..	..	..	..	..	..	..	..	..	1	12	0
Instructor Lieutenant-Commander on promotion	..	..	..	..	..	..	..	..	..	1	14	0
" " " at 2 years' seniority	..	..	..	..	..	..	..	..	..	1	16	0
" " " 4 "	..	..	..	..	..	..	..	..	..	1	18	0
" " " 6 "	..	..	..	..	..	..	..	..	..	2	0	0
" " " 8 "	..	..	..	..	..	..	..	..	..	2	2	0
" " " 10 "	..	..	..	..	..	..	..	..	..	2	2	0

EDUCATION OFFICERS, R.N.—*continued*.

										<i>Daily Rate</i>		
										£	s.	d.
Instructor Commander on promotion	..	..	..	..	..	..	..	..	..	2	7	6
" " at 2 years' seniority	..	..	..	..	..	..	..	..	..	2	10	0
" " " 4 " "	..	..	..	..	..	..	..	..	..	2	12	6
" " " 6 " "	..	..	..	..	..	..	..	..	..	2	15	0
" " " 8 " "	..	..	..	..	..	..	..	..	..	2	17	6
Instructor Captain on promotion	..	..	..	..	..	..	..	..	..	3	5	0
" " at 2 years' seniority	..	..	..	..	..	..	..	..	..	3	8	0
" " " 4 " "	..	..	..	..	..	..	..	..	..	3	11	0
" " " 6 " "	..	..	..	..	..	..	..	..	..	3	14	0
" " " 8 " "	..	..	..	..	..	..	..	..	..	3	17	0

NAVAL WARRANT OFFICERS.

The following rates apply to Warrant Officers, R.N., R.N.R., and R.N.V.R., including Skippers, R.N.R., and officers promoted therefrom, of all categories (excluding those promoted direct to Lieutenant on the general list of ex-cadet officers). They are also payable to officers of the Royal Naval Shore Wireless Service in accordance with their relative rank.

										<i>Daily Rate</i>		
										£	s.	d.
Warrant Officer on promotion	..	..	..	..	..	..	..	..	..	19	0	0
" " after 2 years	..	..	..	..	..	..	..	..	..	1	0	0
" " " 4 " "	..	..	..	..	..	..	..	..	..	1	1	0
" " " 6 " "	..	..	..	..	..	..	..	..	..	1	2	0
" " " 8 " "	..	..	..	..	..	..	..	..	..	1	3	0
Commissioned Officer from warrant rank on promotion	..	..	..	..	..	..	..	..	..	1	4	0
" " " " " after 2 years	..	..	..	..	..	..	..	..	..	1	5	0
" " " " " " 4 " "	..	..	..	..	..	..	..	..	..	1	6	0
" " " " " " 6 " "	..	..	..	..	..	..	..	..	..	1	7	0
" " " " " " 8 " "	..	..	..	..	..	..	..	..	..	1	8	0
" " " " " " 10 " "	..	..	..	..	..	..	..	..	..	1	9	0
Lieutenant on promotion	..	..	..	..	..	..	..	..	..	1	10	0
" after 2 years	..	..	..	..	..	..	..	..	..	1	11	6
" " 4 " "	..	..	..	..	..	..	..	..	..	1	13	0
" " 6 " "	..	..	..	..	..	..	..	..	..	1	14	6
Lieutenant-Commander on promotion	..	..	..	..	..	..	..	..	..	1	16	0
" " after 2 years	..	..	..	..	..	..	..	..	..	1	18	0
" " 4 " "	..	..	..	..	..	..	..	..	..	2	0	0
Commander—as for General List Officers (see page 300).												

ROYAL NAVAL SHORE SIGNAL SERVICE.

										<i>Daily Rate</i>		
										£	s.	d.
Chief Officer on promotion	..	..	..	..	..	..	..	..	..	17	0	0
" " after 2 years	..	..	..	..	..	..	..	..	..	18	0	0
" " " 4 " "	..	..	..	..	..	..	..	..	..	19	0	0
" " " 6 " "	..	..	..	..	..	..	..	..	..	1	0	0
" " " 8 " "	..	..	..	..	..	..	..	..	..	1	1	0
" " " 10 " "	..	..	..	..	..	..	..	..	..	1	2	0
Senior Chief Officer on promotion	..	..	..	..	..	..	..	..	..	1	3	0
" " after 2 years	..	..	..	..	..	..	..	..	..	1	4	0
" " " 4 " "	..	..	..	..	..	..	..	..	..	1	5	0

Ratings' pensions continue to be payable in addition to these rates of pay.

ROYAL MARINE OFFICERS (GENERAL LIST).

										<i>Daily Rate</i>		
										£	s.	d.
Second-Lieutenant under the age of 20 years	..	..	..	..	..	..	..	..	..	7	6	0
" " over " " " 20 " "	..	..	..	..	..	..	..	..	..	11	0	0
Lieutenant (confirmed) under 4 years from date of entry	..	..	..	..	..	..	..	..	..	13	0	0
" " after 4 " " " " " "	..	..	..	..	..	..	..	..	..	17	0	0
" " " 6 " " " " " "	..	..	..	..	..	..	..	..	..	19	0	0
" " " 8 " " " " " "	..	..	..	..	..	..	..	..	..	1	4	0
" " " 10 " " " " " "	..	..	..	..	..	..	..	..	..	1	6	0

ROYAL MARINE OFFICERS (GENERAL LIST)—*continued.*

										Daily Rate
										£ s. d.
Captain on promotion	..	..	..	..	..	..	..	..	..	1 12 0
" after 2 years	..	..	..	..	..	..	..	..	..	1 14 0
" " 4 "	..	..	..	..	..	..	..	..	..	1 16 0
" " 6 "	..	..	..	..	..	..	..	..	..	1 18 0
" " 8 "	..	..	..	..	..	..	..	..	..	2 0 0
" " 10 "	..	..	..	..	..	..	..	..	..	2 2 0
Major on promotion	..	..	..	..	..	..	..	..	..	2 7 6
" after 2 years	..	..	..	..	..	..	..	..	..	2 10 0
" " 4 "	..	..	..	..	..	..	..	..	..	2 12 6
" " 6 "	..	..	..	..	..	..	..	..	..	2 15 0
" " 8 "	..	..	..	..	..	..	..	..	..	2 17 6
Lieutenant-Colonel on promotion	..	..	..	..	..	..	..	..	..	3 5 0
" " after 2 years	..	..	..	..	..	..	..	..	..	3 8 0
" " " 4 "	..	..	..	..	..	..	..	..	..	3 11 0
Colonel on promotion	..	..	..	..	..	..	..	..	..	3 14 0
" after 2 years	..	..	..	..	..	..	..	..	..	3 17 0
Major-General	..	..	..	..	..	..	..	..	..	5 10 0
Lieutenant-General	..	..	..	..	..	..	..	..	..	6 15 0
General	..	..	..	..	..	..	..	..	..	8 0 0

Note.—A Brigadier receives pay as a Colonel.

ROYAL MARINE WARRANT OFFICERS.

The following rates apply to Warrant Officers and officers promoted therefrom, Royal Marines (including Quartermasters and R.N. School of Music).

										Daily Rate
										£ s. d.
Warrant Officer on promotion	..	..	..	..	..	..	..	..	..	19 0
" " after 2 years	..	..	..	..	..	..	..	..	..	1 0 0
" " " 4 "	..	..	..	..	..	..	..	..	..	1 1 0
" " " 6 "	..	..	..	..	..	..	..	..	..	1 2 0
" " " 8 "	..	..	..	..	..	..	..	..	..	1 3 0
Commissioned Officer from warrant rank on promotion	..	..	..	..	..	..	..	..	..	1 4 0
" " " " after 2 years	..	..	..	..	..	..	..	..	..	1 5 0
" " " " " 4 "	..	..	..	..	..	..	..	..	..	1 6 0
" " " " " 6 "	..	..	..	..	..	..	..	..	..	1 7 0
" " " " " 8 "	..	..	..	..	..	..	..	..	..	1 8 0
" " " " " 10 "	..	..	..	..	..	..	..	..	..	1 9 0
Lieutenant on promotion	..	..	..	..	..	..	..	..	..	1 10 0
" after 2 years	..	..	..	..	..	..	..	..	..	1 11 6
" " 4 "	..	..	..	..	..	..	..	..	..	1 13 0
" " 6 "	..	..	..	..	..	..	..	..	..	1 14 6
Captain on promotion	..	..	..	..	..	..	..	..	..	1 16 0
" after 2 years	..	..	..	..	..	..	..	..	..	1 18 0
" " 4 "	..	..	..	..	..	..	..	..	..	2 0 0
Major—as for General List Officers.										

COMMAND MONEY.

Payable to Executive Officers in command of one or a group of H.M. seagoing ships, at the following daily rates :

Captain	..	..	..	..	..	..	..	10s. 0d. or 7s. 0d.
Commander	..	..	..	..	..	..	..	5s. 0d.
Lieutenant-Commander	..	..	..	..	..	..	..	3s. 0d.
Lieutenant	..	..	..	..	..	..	..	3s. 0d.
Sub-Lieutenant	..	..	..	..	..	..	..	2s. 0d.

ENTERTAINING ALLOWANCE.

Payable to Executive and Air Officers appointed in Command at the following daily rates :

Captain in Command of seagoing ship	..	..	..	..	..	..	..	8s. 0d. or 5s. 0d.
" " " " shore establishment	..	..	..	..	..	..	..	5s. 0d. or 2s. 6d.
Commander in Command of seagoing ship	..	..	..	..	..	..	..	2s. 6d.
" " " " shore establishment	..	..	..	..	..	..	..	2s. 0d.*

* Subject to special Admiralty approval.

FLYING AND ASCENT PAY.

Flying Pay is payable continuously at the rate of 3s. 0d. a day to officers of the rank of Lieutenant-Commander and below who are qualified as pilot or observer, so long as they remain appointable for full flying duties.

Officers under training to become qualified Pilots or Observers receive flying pay of 2s. 0d. a day, payable continuously.

Unqualified officers undergoing short air courses receive Ascent Pay of 2s. 0d. for each day on which they make a solo ascent.

SUBMARINE PAY.

Submarine Pay is payable at the rate of 4s. 0d. a day to officers of the rank of Lieutenant-Commander and below when appointed for duty in or with submarines.

SURVEYING PAY.

Surveying Officers receive surveying pay at the following rates, payable continuously from the date of first appointment as Surveyor or Assistant Surveyor, so long as they remain in the Surveying Service.

<i>Grade</i>	<i>Daily Rate</i>
<i>s. d.</i>	
Officer qualified to take charge of a survey :	
Captain and Commander	15 0
Lieutenant-Commander and Lieutenant	10 0
Assistant Surveyor, 1st Class	7 0
" " 2nd "	4 0
" " 3rd "	2 6
" " 4th "	1 0

HARD LYING MONEY.

Payable to officers whilst living and sleeping in ships employed on mainly sea service, at full rates when the living and sleeping conditions are not superior to those in a trawler, and at half rates when the conditions are superior to those in a trawler but markedly inferior to those in a destroyer.

<i>Daily Rate</i>
<i>s. d.</i>
Lieutenant, R.N., and above, and relative ranks
Sub-Lieutenant, Acting Sub-Lieutenant, Midshipman, Cadet, Commissioned
Officer from Warrant Rank and Warrant Officer, and relative ranks
Hard-lying money is not payable to officers in receipt of Surveying Pay.

MARRIAGE ALLOWANCE.

Subject to detailed conditions laid down in Regulations, all married officers aged 25 and over are eligible for Marriage Allowance, payable continuously at the following daily rates :

<i>s. d.</i>
Lieutenant-Commander and below
Commander
Captain of less than 6 years' seniority
Captain of 6 years' seniority or over
Flag Officers and Officers of Flag rank

LODGING ALLOWANCE.

Officers for whom accommodation cannot be provided on board H.M. Ships or in Naval or R.M. Barracks or in service quarters generally are eligible under certain conditions for Lodging Allowance at the following rates :

Rear-Admiral and above	} 20s. 0d. a day
Commodore, 1st Class	
Commodore, 2nd Class	} 17s. 0d. a day
Captain in receipt of the "over 6 years" or "over 8 years" rate of pay	
Captain in receipt of pay less than the "over 6 years" rate	} 14s. 0d. a day
Commander	
Lieut.-Cdr., Lieut., Sub-Lieut., Act. Sub-Lieut.	} 11s. 0d. a day
Commissioned Officer from Warrant Rank	
Warrant Officer	

Lodging allowance is not normally payable in addition to Marriage Allowance, or to officers whilst on leave.

RATION ALLOWANCE.

Ration Allowance replaces Provision Allowance and is payable under certain conditions to officers entitled to service victualling who cannot be so victualled. The current rate is 3s. 2d. a day in the British Isles; abroad the rate varies according to the station.

LONDON ALLOWANCE.

Officers whose place of duty is within ten miles of Charing Cross and who are not provided with accommodation at public expense will be entitled to London Allowance at the following rates as a supplement to lodging allowance or marriage allowance:

Rear-Admiral and above	5s. 0d. a day
Commodore 1st Class	
Commodore 2nd Class	4s. 6d. a day
Captain in receipt of the "over 6 years" or "over 8 years" rate of pay	
Captain in receipt of pay less than the "over 6 years" rate	4s. 0d. a day
Commander	
Lieut.-Commander and below	3s. 6d. a day
Commissioned Officer from Warrant Rank	
Warrant Officer	

PAY—MEN.

1. Basic pay for men and boys of all branches is as follows, according to their relative rank.

	<i>Daily Rate</i>
	<i>s. d.</i>
Royal Navy (men):	
Master-at-Arms	11 6
Chief Petty Officer	10 6
Petty Officer	9 0
Leading Rating	7 6
Able Seaman	6 0
Ordinary Seaman (ex-Boy): Ordinary Seaman (direct entry) on completion of training	5 0
Ordinary Seaman (direct entry) under training	4 0

Royal Marines (other ranks):

Sergeant Major	12 6
Staff Sergeant	11 0
Colour Sergeant	10 6
Sergeant	9 0
Corporal	7 6
Marine 1st Class	6 0
Marine 2nd Class (on completion of basic training)	5 0
Marine 2nd Class (Recruit)	4 0

Boys:

At 17½ years of age	4 0
1st Class: R.M. boy after one years' training	2 0
2nd Class, on entry	1 6

Artificer Apprentice:

At 17½ years of age	4 0
During third year of training if under 17½ years of age	2 6
During second year of training	2 0
On entry	1 6

2. Incremental Pay.—Payable at following rates for every two years of man's service from the age of 18 years, or date of entry, if later.

	<i>Daily Rates</i>
	<i>s. d.</i>
Leading Rating and above (not subject to a maximum)	0 3
Able Seaman rating and below (limited to a total of six increments)	0 2
Sergeant Major and Staff Sergeant, R.M.	0 3
R.M. (other ranks) at the rate for the equivalent Naval rating.	

3. Trade Pay.

Issuable to Artificer, Artisan, and Mechanician ratings at the following rates :

	<i>Daily Rate</i>	
	<i>s.</i>	<i>d.</i>
"Chief" Rating, Artificer, Shipwright, and Mechanician Branches ..	2	0
1st and 2nd Class Artificers and Shipwrights	1	6
Mechanician with 9 years as such	1	6
3rd and 4th Class Artificers and Shipwrights	1	0
Mechanicians with 3 years as such	1	0

Direct entries in Artificer and Artisan branches will be paid according to the rating assigned to them by their age and trade qualifications.

An Artisan 5th Class entered under the New Pay Code ranks with Able Seaman.

4. Good Conduct Badges and Pay :

Awarded to a maximum number of three. Period of qualifying service for each badge is four years. Rate of payment for each badge held is 4d. a day

5. R.N. Shore Wireless Service :

	<i>Daily Rate</i>	
	<i>s.</i>	<i>d.</i>
Petty Officer	9	0
Leading Telegraphist	7	6
Telegraphist	6	0

R.N. Shore Signal Service :

Petty Officer after 2 years as such	10	6
Petty Officer	10	0
Signalman after 2½ years as such	8	6
Signalman	7	0

ALLOWANCES—MEN.

	<i>Weekly</i>	
	<i>s.</i>	<i>d.</i>
Marriage Allowance (Rates subject to payment of a qualifying allotment) :		
Chief Petty Officer (qualifying allotment, 24s. 6d.)	42	6
Petty Officer (qualifying allotment, 17s. 6d.)	40	0
Leading rating and below (qualifying allotment 10s. 6d.)	35	0
Corporal, R.M. and below (qualifying allotment 10s. 6d.)	35	0
Sergeant, R.M. (qualifying allotment, 17s. 6d.)	40	0
Colour Sergeant, R.M. (qualifying allotment, 24s. 6d.)	42	6
Sergeant Major and Staff Sergeant (qualifying allotment, 28s.)	45	0

Flying Pay :

	<i>Daily Rate</i>	
	<i>s.</i>	<i>d.</i>
Rating Pilot and Observer	3	0
T.A.G.	2	6
Rating not already in receipt of Flying Pay, who forms part of an aircrew	1	0
Sick Berth rating, N.A. Ambulance Service	1	0

Special Responsibility and Duty Allowances :

Butcher	0	3
" R.M.	0	3
Charge Allowance—Departmental Stores	6d. or	1 0
" " Supply rating	1	0
Charge of Machinery—to Chief E.R.A. and Chief Mechanician	1	0
" " " to Engine Room ratings other than E.R.A. and Mechanician	0	6
Command of Tenders, etc.	1	0
Cook—Senior Cook Rating (General Mess)	1	0
" Acting Cook (K.R., App. XVII, Part 3)	3d and	0 6
Coxswain	1	0
Navigator's Yeoman	0	6
Schoolmaster, Acting	0	8
Senior Engineer	1	0
Sick Berth C.P.O., acting as Wardmaster	0	6
" " Attendant, acting (K.R., App. XVII, Part 3) (a)	0	6
" " " " " " (b)	0	3
Storeman, R.M.	0	6
Tailor and Tailor Sergeant, R.M.	1	0

										<i>Daily Rate</i>	
										<i>s.</i>	<i>d.</i>
Tailor Storeman, R.M.	..	..	..	..	..	..	..	..	..	0	6
Writer—Air Engineer's	..	..	..	..	..	..	..	..	..	0	6
„ Air Gunnery Officer's	..	..	..	..	..	..	..	..	..	0	6
„ Anti S/M Officer's	..	..	..	..	..	..	..	..	..	0	6
„ Captain's	..	..	..	..	..	..	..	..	..	1	0
„ Charge Allowance	..	..	..	..	..	..	..	..	..	1	0
„ Commander's Office	..	..	..	..	..	..	..	..	..	0	6
„ Destroyers and Submarines	..	..	..	..	..	..	..	..	..	0	6
„ Engineer's	..	..	..	..	..	..	..	..	..	0	6
„ Gunnery Officer's	..	..	..	..	..	..	..	..	..	0	6
„ Senior Officer's	..	..	..	..	..	..	..	..	..	1	0
„ Torpedo Officer's	..	..	..	..	..	..	..	..	..	0	6

Not more than one Special Responsibility or Duty Allowance is payable to the same individual at any one time.

										<i>Daily Rate</i>	
										<i>s.</i>	<i>d.</i>
Submarine Pay :											
Leading rating and above	..	..	..	..	..	..	..	..	..	3	6
Able Seaman rating and below	..	..	..	..	..	..	..	..	..	2	6
Special Qualification Allowance :											
E.R.A. Watch Certificate Allowance	..	..	..	..	..	..	..	..	..	1	0
E.R. Charge Certificate Allowance	..	..	..	..	..	..	..	..	..	1	0
Shorthand Typist, Higher Grade	..	..	..	..	..	..	..	..	..	1	6
„ „ Lower Grade	..	..	..	..	..	..	..	..	..	0	9
Instructor Allowance (continuous) :											
All branches	..	..	..	..	..	..	..	..	..	1	0
Difference of Specialist Pay :											
Leading Rating with 1st Class non-substantive rate	..	..	..	..	..	..	..	..	..	0	6
Able Seaman Rating with 2nd Class non-substantive rate	..	..	..	..	..	..	..	..	..	0	6
Ordinary Seaman Rating with 3rd Class non-substantive rate	..	..	..	..	..	..	..	..	..	0	3
Lodging Allowance :											
Sergeant Major and Staff Sergeant, R.M.	..	..	..	..	..	..	..	..	..	5	0
Chief Petty Officer and Petty Officer	..	..	..	..	..	..	..	..	..	3	6
Leading Rating and below	..	..	..	..	..	..	..	..	..	2	6
R.M. (other ranks) at the rate for the equivalent Naval rating.											
London Allowance :											
Sergeant Major and Staff Sergeant, R.M.	..	..	..	..	..	..	..	..	..	1	9
Chief Petty Officer and Petty Officer	..	..	..	..	..	..	..	..	..	1	3
Leading Rating and below	..	..	..	..	..	..	..	..	..	1	0
R.M. (other ranks) at the rate for the equivalent Naval rating.											
Ration Allowance :											
Sergeant Major, R.M., and below	..	..	..	..	..	..	..	..	..	3	2
Chief Petty Officer and below	..	..	..	..	..	..	..	..	..	3	2
Shore Signal and Wireless Services—ratings	..	..	..	..	..	..	..	..	..	2	8

STATEMENT PRESENTED TO HOUSE OF LORDS

On January 29, 1947.

WARSHIPS TRANSFERRED TO DOMINION, INDIAN, AND FOREIGN GOVERNMENTS.

Dominion and Indian Governments.

	Ships Transferred	Standard Displacement	Terms and Date of Transfer	Remarks
<i>To Australia</i>	CRUISER Shropshire	9,830	Given, 1943	
	DESTROYERS Queenborough	1,705	Lent, 1945	
	Quadrant	"		
	Quickmatch	"		
	Quality	"		
	Quiberon	"		
<i>To Canada</i>	LIGHT FLEET CARRIERS Warrior	14,000	Lent, 1946	
	Magnificent	14,000	To be lent in 1947	
	CRUISERS Ontario late Mino- taur	8,000	Given, 1945	
	Uganda	8,000	Given, 1944	
	DESTROYERS Crescent	1,730	Given, 1945	
	Crusader	1,730		
	ESCORT DESTROYERS Griffin now Ottawa	1,335	Lent, 1943	
	Fortune now Saskatchewan	1,350		
	Decoy now Kootenay	1,375	Lent, 1943	
	Express now Gati- neau	1,375		
	Hero now Chaudiere	1,375	Lent, 1944	
	Foxhound now Qu'Appelle	1,350		
<i>To Eire</i>	" FLOWER " CLASS CORVETTES 3	1,000	Sold, 1946	Transfer will be made shortly.
	3	"	To be sold, 1947	
<i>To New Zealand</i>	CRUISERS Black Prince	5,770	Lent, 1946	
	Bellona	5,700		
	" FLOWER " CLASS CORVETTES 2	—	Given, 1944	
<i>To South Africa</i>	FRIGATES Natal late Loch Cree	1,435	Given, 1945	
	Good Hope late Loch Boisdale	1,435	Given, 1944	
	Transvaal late Loch Ard	1,435	Given, 1945	
<i>To India</i>	CRUISERS Achilles	7,030	To be sold	To be transferred during 1947 and 1948.
	Ajax	6,985		
	Leander	7,270		
	" RIVER " CLASS FRIGATES Tir late Bann	1,460	Transferred, 1945	Terms of transfer to be dealt with as part of the general settlement of sterling balances held in India.
	Dhanush late Deveron	1,370		
	Shamsher late Nadder	1,370	1945	
	Trent	1,460	1946	
	Test	1,460	1946	
	" FLOWER " CLASS CORVETTES 2	1,000	1945 and 1946	

Foreign Governments.

	Ships Transferred	Standard Displace- ment	Terms and Date of Transfer	Remarks
<i>To Belgium</i>	BOOM DEFENCE VESSEL Barcock	750	Chartered, 1946	
	MOTOR MINE- SWEEPERS 9	each 255	Lent, 1944	
<i>To China</i>	CRUISER Aurora	5,270	Lent	To be transferred in summer 1947.
	" FLOWER CLASS CORVETTE	1,000	Lent, 1946	
	HARBOUR DEFENCE MOTOR LAUNCHES 8 each	46	Lent	Awaiting shipment.
<i>To Denmark</i>	SUBMARINES Morse	658	Chartered 1946	Option to purchase at end of 3 years.
	Vulpine	545		
	P. 52	646		
	FRIGATES Annan	1,370	Sold, 1945	
	Monnow	1,370		
	" FLOWER " CLASS CORVETTE	1,000	Sold, 1946	
	M.M.S. 4 each	360	Lent, 1946	
	6 each	255		
<i>To France</i>	LIGHT FLEET CARRIER Colossus	13,190	Lent, 1946	Option to purchase at end of 3-5 years.
	SUBMARINE Vineyard	545	Lent, 1944	
	" RIVER " CLASS FRIGATES Windrush	1,365	Sold, 1947	
	Torridge			
	Braid			
	Frome			
	Strule			
	Moyola			
	" FLOWER " CLASS CORVETTES 7	1,000	Lent, 1943	Purchase under considera- tion by French Govern- ment.
	H.D.M.Ls. 21 each	40	Lent, 1946	
	MOTOR FISHING VESSEL 1	40	Lent, 1945	
	LANDING CRAFT TANK 1		Lent, 1945	
	M.Ls. 6 each	40	Sold at vari- ous dates between 1944-1946	
	6 each	40	Lent at vari- ous dates between 1944-1946	
	7 each	75	Lent at vari- ous dates between 1944-1946	
	M.M.S. 6 each	360	Lent at vari- ous dates between 1944-1946	
	16 each	255		

Foreign Governments—*continued.*

	Ships Transferred	Standard Displace- ment	Terms and Date of Transfer	Remarks
<i>To Greece</i>	DESTROYERS			
	Echo	1,375	Lent, 1944	
	Boreas	1,360	Lent, 1946	
	Catterick		Lent, 1942	
	Modbury		Lent, 1946	
	Tanatside		Lent, 1942	
	Bolebroke		Lent, 1942	
	Hatherleigh		Lent, 1943	
	Bramham		Lent, 1943	
	Hursley		Lent, 1946	
	Lauderdale			
	SUBMARINES			
	Veldt	545	Lent, 1943	
	Vengeful	545	Lent, 1945	
	Volatile	545	Lent, 1946	
	Virulent	545	Lent, 1946	
	Upstart	540	Lent, 1945	
	Untiring	510	Lent, 1945	
	"FLOWER" CLASS			
	CORVETTES			
	4	1,000	Lent, 1942-43	To Ministry of Merchant Marine without arma- ment. A dock of 750 tons lifting capacity.
	7	"	Sold, 1945-46	
	FLOATING DOCK			
	A.F.D. 45		Lent, 1946	
	COASTAL SALVAGE			
<i>To Italy</i>	VESSEL			
	Kingarth	900	On Charter, 1946	
	H.D.M.Ls.			
	8	46	Lent, 1945-46	
	9	75	Lent, 1944-46	
	M/S DEPOT SHIP (Ex trawler)			
	Product	452	Lent, 1946	
	M.M.S.			
	8	255	Lent, 1945-46	
	DRIFTER			
	Fellowship	—	Lent, 1945	
	L.C.T.			
	6	—	Lent, 1946	
	M.M.S.			
	17	255	Lent for period of mine clear- ance, 1946	
<i>To Netherlands</i>	MINESWEEPING			
	TRAWLERS			
	16	500	Lent for period of mine clear- ance, 1946	
	ESCORT CARRIER (Ex cargo liner)			
	Nairana	13,825	Lent, 1946 for 2 years	Netherlands Govt. will pur- chase a Light Fleet Carrier at end of period of loan.
	DESTROYERS			
	Noble			
	Nonpareil			
	Serapis			
	Scourge			
	Scorpion			
	Quilliam			
	FRIGATE			
	Ribble	1,450	Sold, 1943	
	SUBMARINES			
	Talent	1,090	Sold, 1943	
	Tarn	1,090	Sold, 1944	
	P.47	540	Sold, 1945	
	M.T.Bs.			
	8	38	Sold, 1941-43	

Foreign Governments—continued.

	Ships Transferred	Standard Displace- ment	Terms and Date of Transfer	Remarks		
<i>To Turkey</i>	DESTROYERS Inconstant	1,370	Transferred, 1945	Ships building for Turkey in this country under the Anglo-Turkish Arms Credits of 1938-39 and requisitioned by H.M. Govt. during the war or in replacement of such ships lost during the war.		
	Oribi	1,540	Transferred, 1946			
	SUBMARINE P.614	624	Transferred, 1946			
	MINESWEEPERS 3	650	Transferred, 1946			
	2	650	Sold, 1946			
	M.M.S. 4	360	Sold, 1946			
	"BAR" CLASS BOOM DEFENCE VESSELS Barbarian Barfair	750	Transferred, 1946			
	M.Ls. 8					
	H.D.M.Ls. 8	45	Transferred, 1946			
	MINE RECOVERY LAUNCHES 8	—	Transferred, 1942-43			
	<i>To U.S.S.R.</i>	BATTLESHIP Royal Sovereign	29,150		Lent, 1944	Circumstances of loan as announced by Prime Minister in the House of Commons on June 5, 1945.
		DESTROYERS St. Albans Chelsea Leamington Richmond Brighton Roxborough Churchill Georgetown Lincoln	1,090		Lent, 1944	
SUBMARINES Sunfish Unbroken Unison Ursula	768 646 646 646	Lent, 1944				
<i>To Yugo-Slavia</i>			"FLOWER" CLASS CORVETTE 1	1,060	Lent, 1945	

SUMMARY

	Battleship	Light Fleet Carrier	Escort Carrier	Cruisers	Destroyers	Submarines	Frigates	Corvettes	Landing Craft (Tank)	Minesweepers	Trawlers (A/S M/S)	Motor Minesweepers	Motor Torpedo Boats (incl. M.G. Bts.)	Motor Launches	Harbour Defence Motor Launches	Boom Vessels	M.F.Vs.	Floating Docks	Salvage Vessels	M/S Depot Ship	Drifters	Escort Maintenance Vessel	H.S.P.B.	Mine Recovery Launches
<i>Domestic Governments</i>																								
Australia																								
Canada																								
Eire																								
New Zealand																								
Union of South Africa																								
India																								
<i>Foreign Governments</i>																								
Belgium																								
China																								
Denmark																								
France																								
Greece																								
Italy																								
Netherlands																								
Norway																								
Portugal																								
Turkey																								
U.S.S.R.																								
Yugoslavia																								
Siam																								

† To be transferred at a future date.

* Includes ships which are still the subject of negotiations.

NAVAL PROVISIONS IN THE PEACE TREATIES.

(Cmd. 7022.)

ITALY.

SECTION III. LIMITATION OF THE ITALIAN NAVY.

Article 56.

1. The present Italian Fleet shall be reduced to the units listed in Annex XII A.

2. Additional units not listed in Annex XII and employed only for the specific purpose of minesweeping, may continue to be employed until the end of the mine clearance period as shall be determined by the International Central Board for Mine Clearance of European Waters.

3. Within two months from the end of the said period, such of these vessels as are on loan to the Italian Navy from other Powers shall be returned to those Powers, and all other additional units shall be disarmed and converted to civilian use.

Article 57.

1. Italy shall effect the following disposal of the units of the Italian Navy specified in Annex XII B :

(a) The said units shall be placed at the disposal of the Governments of the Soviet Union, of the United Kingdom, of the United States of America, and of France ;

(b) Naval vessels required to be transferred in compliance with subparagraph (a) above shall be fully equipped, in operational condition including a full outfit of armament stores, and complete with on-board spare parts and all necessary technical data ;

(c) The transfer of the naval vessels mentioned above shall be effected within three months from the coming into force of the present Treaty, except that, in the case of naval vessels that cannot be refitted within three months, the time limit for the transfer may be extended by the Four Governments ;

(d) Reserve allowance of spare parts and armament stores for the naval vessels mentioned above shall, as far as possible, be supplied with the vessels.

The balance of reserve spare parts and armament stores shall be supplied to an extent and at dates to be decided by the Four Governments, in any case within a maximum of one year from the coming into force of the present Treaty.

2. Details relating to the above transfers will be arranged by a Four Power Commission to be established under a separate protocol.

3. In the event of loss or damage, from whatever cause, to any of the vessels in Annex XII B scheduled for transfer, and which cannot be made good by the agreed date for transfer of the vessel or vessels concerned, Italy undertakes to replace such vessel or vessels by equivalent tonnage from the

list in Annex XII A, the actual vessel or vessels to be substituted being selected by the Ambassadors in Rome of the Soviet Union, of the United Kingdom, of the United States of America, and of France.

Article 58.

1. Italy shall effect the following disposal of submarines and non-operational naval vessels. The time limits specified below shall be taken as commencing with the coming into force of the present Treaty.

(a) Surface naval vessels afloat not listed in Annex XII, including naval vessels under construction afloat, shall be destroyed or scrapped for metal within nine months.

(b) Naval vessels under construction on slips shall be destroyed or scrapped for metal within nine months.

(c) Submarines afloat and not listed in Annex XII B shall be sunk in the open sea in a depth of over 100 fathoms within three months.

(d) Naval vessels sunk in Italian harbours and approach channels, in obstruction of normal shipping, shall, within two years, either be destroyed on the spot or salvaged and subsequently destroyed or scrapped for metal.

(e) Naval vessels sunk in shallow Italian waters not in obstruction of normal shipping shall within one year be rendered incapable of salvage.

(f) Naval vessels capable of reconversion which do not come within the definition of war material, and which are not listed in Annex XII, may be reconverted to civilian uses or are to be demolished within two years.

2. Italy undertakes, prior to the sinking or destruction of naval vessels and submarines as provided for in the preceding paragraph, to salvage such equipment and spare parts as may be useful in completing the on-board and reserve allowances of spare parts and equipment to be supplied, in accordance with Article 57, paragraph 1, for all ships specified in Annex XII B.

3. Under the supervision of the Ambassadors in Rome of the Soviet Union, of the United Kingdom, of the United States of America, and of France, Italy may also salvage such equipment and spare parts of a non-warlike character as are readily adaptable for use in Italian civil economy.

Article 59.

1. No battleship shall be constructed, acquired or replaced by Italy.

2. No aircraft carrier, submarine or other submersible craft, motor torpedo boat or specialised types of assault craft shall be constructed, acquired, employed or experimented with by Italy.

3. The total standard displacement of the war vessels, other than battleships, of the Italian Navy, including vessels under construction after the date of launching, shall not exceed 67,500 tons.

4. Any replacement of war vessels by Italy shall be effected within the limit of tonnage given in paragraph 3. There shall be no restriction on the replacement of auxiliary vessels.

5. Italy undertakes not to acquire or lay down any war vessels before January 1, 1950, except as necessary to replace any vessel, other than a battleship, accidentally lost, in which case the displacement of the new vessel is not to exceed by more than ten per cent. the displacement of the vessel lost.

6. The terms used in this Article are, for the purposes of the present Treaty, defined in Annex XIII A.

Article 60.

1. The total personnel of the Italian Navy, excluding any naval air personnel, shall not exceed 25,000 officers and men.

2. During the mine clearance period as determined by the International Central Board for Mine Clearance of European Waters, Italy shall be authorised to employ for this purpose an additional number of officers and men not to exceed 2,500.

3. Permanent naval personnel in excess of that permitted under paragraph 1 shall be progressively reduced as follows, time limits being taken as commencing with the coming into force of the present Treaty :

(a) To 30,000 within six months ;

(b) To 25,000 within nine months.

Two months after the completion of minesweeping by the Italian Navy, the excess personnel authorised by paragraph 2 is to be disbanded or absorbed within the above numbers.

4. Personnel, other than those authorised under paragraphs 1 and 2, and other than any naval air personnel authorised under Article 65, shall not receive any form of naval training as defined in Annex XIII B.

SECTION V. LIMITATION OF THE ITALIAN AIR FORCE.

Article 64.

1. The Italian Air Force, including any naval air arm, shall be limited to a force of 200 fighter and reconnaissance aircraft and 150 transport, air-sea rescue, training (school type) and liaison aircraft. These totals include reserve aircraft. All aircraft except for fighter and reconnaissance aircraft shall be unarmed. The organisation and armament of the Italian Air Force as well as their deployment throughout Italy shall be designed to meet only tasks of an internal character, local defence of Italian frontiers and defence against air attack.

SECTION IX. MINE CLEARANCE.

Article 72.

As from the coming into force of the present Treaty, Italy will be invited to join the Mediterranean Zone Board of the International Organisation for Mine Clearance of European Waters, and shall maintain at the disposal of the Central Mine Clearance Board all Italian minesweeping forces until the end of the post-war mine clearance period as determined by the Central Board.

ANNEX XII.

(See Article 56.)

The names in this Annex are those which were used in the Italian Navy on June 1, 1946.

A. LIST OF VESSELS TO BE RETAINED BY ITALY.

MAJOR WAR VESSELS.

<i>Battleships</i> . . .	Andrea Doria Caio Duilio	<i>Torpedo Boats</i>	Giuseppe Cesare Abba Aretusa Calliope Giacinto Carini Cassiopea Clio Nicola Fabrizi Ernesto Giovannini Libra Monzambano Antonio Mosto Orione Orsa Rosalino Pilo Sigittario Sirio
<i>Cruisers</i>	Luigi di Savoia Duca degli Abruzzi Giuseppe Garibaldi Raimondo Montecuccoli Luigi Cadorna		
<i>Destroyers</i> . . .	Carabiniere Granatiere Grecale Nicoloso da Recco		
<i>Corvettes</i> . .	Ape Baionetta Chimera Cormorano Danaide Driade Fenice	Flora Folaga Gabbiano Gru Ibis Minerva	Pellicano Pomona Scimmittara Sfinge Sibilla Urania

Together with one corvette to be salvaged, completed or constructed.

MINOR WAR VESSELS.

Minesweepers R. D. Nos. 20, 92, 94, 98, 40, 41, 102, 103, 104, 105, 113, 114, 129, 131, 132, 133, 134, 148, 149, together with 16 YMS type acquired from the United States of America.

Vedettes VAS Nos. 201, 204, 211, 218, 222, 224, 233, 235.

AUXILIARY NAVAL VESSELS.

<i>Fleet Tankers</i> . .	Nettuno Lete	<i>Tugs (large)</i> . .	Abbazia Asinara Atlante Capraia Chioggia Emilio Gagliardo Gorgona Licosa Lilibeo Linosa Mestre Piombino Porto Empedocle Porto Fossone
<i>Water Carriers</i> . .	Arno Frigido Mincio]] Ofanto Oristano Pescara Po Sesia Simeto Stura Tronto Vipacco		

<i>Tugs (large)</i>	Porto Pisano	<i>Tugs (small)</i> . . .	N 1
(continued)	Porto Rose	(continued)	N 4
	Porto Recanati		N 5
	San Pietro		N 9
	San Vito		N 22
	Ventimiglia		N 26
			N 27
<i>Tugs (small)</i> . . .	Argentario		N 32
	Astico		N 47
	Cordevole		N 52
	Generale Pozzi		N 53
	Irene		N 78
	Passero		N 96
	Porto Rosso		N 104
	Porto Vecchio		RLN 1
	San Bartolomeo		RLN 3
	San Benedetto		RLN 9
	Tagliamento		RLN 10

Training Ship Amerigo Vespucci

Transports Amalia Messina
Montegrappa
Tarantola

Supply Ship Giuseppe Miraglia

Repair Ship Antonio Pacinotti (after conversion
from S/M Depot Ship)

Surveying Ships Azio (after conversion from mine-
layer)
Chersq

Lighthouse-Service Vessel Buffoluto

Cable Ship Rampino

**B. LIST OF NAVAL VESSELS TO BE PLACED AT THE DISPOSAL OF THE
GOVERNMENTS OF THE SOVIET UNION, OF THE UNITED KINGDOM,
OF THE UNITED STATES OF AMERICA, AND OF FRANCE.**

MAJOR WAR VESSELS.

<i>Battleships</i>	Giulio Cesare	<i>Sloop</i>	Eritrea
	Italia		
	Vittorio Veneto	<i>Destroyers</i>	Artigliere
			Fuciliere
<i>Cruisers</i>	Emanuele Filiberto		Legionario
	Duca d'Aosta		Mitragliere
	Pompeo Magno		Alfredo Oriani
	Attilio Regolo		Augusto Riboty
	Eugenio di Savoia		Velite
	Scipione Africano		

Torpedo Boats..AliseoAnimoso
Ardimentoso
Ariete
Fortunale
Indomito*Submarines* ...AlagiAtropo
Dandolo
Giada
Marea
Nichelio
Platino
Vortice

MINOR WAR VESSELS.

M.T.Bs.MS Nos. 11, 24, 31, 35, 52, 53, 54, 55, 61, 65, 72, 73, 74, 75.
 MAS Nos. 493, 494, 510, 514, 516, 519, 520, 521, 523, 538,
 540, 543, 545, 547, 562.
 ME Nos. 38, 40, 41.

Minesweepers ..RD Nos. 6, 16, 21, 25, 27, 28, 29.*Gunboat*Illyria*Vedettes*VAS Nos. 237, 240, 241, 245, 246, 248.

Landing Craft ..MZ Nos. 713, 717, 722, 726, 728, 729, 737, 744, 753, 776,
 778, 780, 781, 784, 800, 831.

AUXILIARY NAVAL VESSELS.

TankersPrometeo
 Stige
 Tarvisio
 Urano

Tugs (largeGaeta
 (continued) Lampedusa

Water Carriers ..Anapo
 Aterno
 Basento
 Bisagno
 Dalmazia
 Idria
 Isarco
 Istria
 Liri
 Metauro
 Polcevera
 Sprugola
 Timavo
 Tirso

Lipari
 Liscanera
 Marechiaro
 Mesco
 Molara
 Nereo
 Porto Adriano
 Porto Conte
 Porto Quieto
 Porto Torres
 Porto Tricase
 Procida
 Promontore
 Rapallo
 Salvore
 San Angelo
 San Antioco
 San Remo
 Talamone
 Taormina
 Teulada
 Tifeo
 Vado
 Vigoroso

Tugs (large).....Arsachena
 Basiluzzo
 Capo d'Istria
 Carbonara
 Cefalu
 Ercole

<i>Tugs (small)</i>	Generale Valfre	<i>Depot Ship</i>	Anteo
	Licata		
	Noli		
	Volosca	<i>Training Ship</i> . . .	Cristoforo Colombo
	N 2		
	N 3		
	N 23	<i>Auxiliary Mine-</i>	
	N 24	<i>Layer</i>	Fasana
	N 28		
	N 35		
	N 36	<i>Transports</i>	Giuseppe Messina
	N 37		Montecucco
	N 80		Panigaglia
	N 94		

ANNEX XIII. DEFINITIONS.

A. NAVAL.

(See Article 59.)

Standard Displacement.

The standard displacement of a surface vessel is the displacement of the vessel, complete, fully manned, engined and equipped ready for sea, including all armament and ammunition, equipment, outfit, provisions and fresh water for crew, miscellaneous stores and implements of every description that are intended to be carried in war, but without fuel or reserve feed water on board.

The standard displacement is expressed in tons of 2,240 lbs. (1,016 Kgs.).

War Vessel.

A war vessel, whatever its displacement, is :

1. A vessel specifically built or adapted as a fighting unit for naval, amphibious or naval air warfare ; or
2. A vessel which has one of the following characteristics :
 - (a) mounts a gun with a calibre exceeding 4·7 inches (120 mm.) ;
 - (b) mounts more than four guns with a calibre exceeding 3 inches (76 mm.) ;
 - (c) is designed or fitted to launch torpedoes or to lay mines ;
 - (d) is designed or fitted to launch self-propelled or guided missiles ;
 - (e) is designed for protection by armour plating exceeding 1 inch (25 mm.) in thickness ;
 - (f) is designed or adapted primarily for operating aircraft at sea ;
 - (g) mounts more than two aircraft launching apparatus ;
 - (h) is designed for a speed greater than twenty knots if fitted with a gun of calibre exceeding 3 inches (76 mm.).

A war vessel belonging to sub-category 1 is no longer to be considered as such after the twentieth year since completion if all weapons are removed.

Battleship.

A battleship is a war vessel, other than an aircraft carrier, the standard displacement of which exceeds 10,000 tons or which carries a gun with a calibre exceeding 8 inches (203 mm.).

Aircraft Carrier.

An aircraft carrier is a war vessel, whatever her displacement, designed or adapted primarily for the purpose of carrying and operating aircraft.

Submarine.

A submarine is a vessel designed to operate below the surface of the sea.

Specialised Types of Assault Craft.

1. All types of craft specially designed or adapted for amphibious operations.
2. All types of small craft specially designed or adapted to carry an explosive or incendiary charge for attacks on ships or harbours.

Motor Torpedo Boat.

A vessel of a displacement less than 200 tons, capable of a speed of over 25 knots and of operating torpedoes.

NAVAL TRAINING.

(See Article 60.)

3. Naval training is defined as : the study, administration or practice in the use of warships or naval establishments as well as the study or employment of all apparatus and training devices relative thereto, which are used in the prosecution of naval warfare, except for those which are also normally used for civilian purposes ; also the teaching, practice or organised study of naval tactics, strategy and staff work including the execution of all operations and manoeuvres not required in the peaceful employment of ships.

NOTE.—This definition is also included in each of the Treaties cited below.

PROHIBITED WAR MATERIAL.

Category IV.

1. Warships of all kinds, including converted vessels and craft designed or intended for their attendance or support, which cannot be technically reconverted to civilian use, as well as weapons, armour, ammunition, aircraft and all other equipment, material machines and installations not used in peace time on ships other than warships.

2. Landing craft and amphibious vehicles or equipment of any kind ; assault boats or devices of any type as well as catapults or other apparatus for launching or throwing aircraft, rockets, propelled weapons or any other missile, instrument or device whether manned or unmanned, guided or uncontrolled.

8. Submersible or semi-submersible ships, craft, weapons, devices, or apparatus of any kind, including specially designed harbour defence booms, except as required by salvage, rescue or other civilian uses, as well as all equipment, accessories, spare parts, experimental or training aids, instruments or installations as may be specially designed for the construction, testing, maintenance or housing of the same.

NOTE.—This definition is also included in each of the other Treaties cited below.

ROUMANIA.

Article 11.

The maintenance of land, sea and air armaments and fortifications shall be closely restricted to meeting tasks of an internal character and local defence of frontiers. In accordance with the foregoing, Roumania is authorised to have armed forces consisting of not more than :

(a) A land army, including frontier troops, with a total strength of 120,000 personnel ;

(b) Anti-aircraft artillery with a strength of 5,000 personnel ;

(c) A navy with a personnel strength of 5,000 and a total tonnage of 15,000 tons ;

(d) An air force, including any naval air arm, of 150 aircraft, including reserves, of which not more than 100 may be combat types of aircraft, with a total personnel strength of 8,000. Roumania shall not possess or acquire any aircraft designed primarily as bombers with internal bomb-carrying facilities.

These strengths shall in each case include combat, service and overhead personnel.

Article 13.

Personnel not included in the Roumanian Army, Navy or Air Force shall not receive any form of military training, naval training or military air training as defined in Annex II.

Article 14.

Roumania shall not possess, construct or experiment with any atomic weapon, any self-propelled or guided missiles or apparatus connected with their discharge (other than torpedoes and torpedo-launching gear comprising the normal armament of naval vessels permitted by the present Treaty), sea mines or torpedoes of non-contact types actuated by influence mechanisms, torpedoes capable of being manned, submarines or other submersible craft, motor torpedo boats, or specialised types of assault craft.

BULGARIA.

Article 9.

The maintenance of land, sea and air armaments and fortifications shall be closely restricted to meeting tasks of an internal character and local defence of frontiers. In accordance with the foregoing, Bulgaria is authorised to have armed forces consisting of not more than :

(a) A land army, including frontier troops, with a total strength of 55,000 personnel ;

- (b) Anti-aircraft artillery with a strength of 1,800 personnel ;
- (c) A navy with a personnel strength of 3,500 and a total tonnage of 7,250 tons ;
- (d) An air force, including any naval air arm, of 90 aircraft, including reserves, of which not more than 70 may be combat types of aircraft, with a total personnel strength of 5,200. Bulgaria shall not possess or acquire any aircraft designed primarily as bombers with internal bomb-carrying facilities.

These strengths shall in each case include combat, service and overhead personnel.

(Other provision are as those quoted from the Rumanian Treaty.)

HUNGARY.

Article 15.

Hungary shall not possess, construct or experiment with any atomic weapon, any self-propelled or guided missiles or apparatus connected with their discharge (other than torpedoes and torpedo launching gear comprising the normal armament of naval vessels permitted by the present Treaty), sea mines or torpedoes of non-contact types actuated by influence mechanisms, torpedoes capable of being manned, submarines or other submersible craft, motor torpedo boats, or specialised types of assault craft.

FINLAND.

Article 13.

The maintenance of land, sea and air armaments and fortifications shall be closely restricted to meeting tasks of an internal character and local defence of frontiers. In accordance with the foregoing, Finland is authorised to have armed forces consisting of not more than :

(a) A land army, including frontier troops and anti-aircraft artillery, with a total strength of 34,400 personnel ;

(b) A navy with a personnel strength of 4,500 and a total tonnage of 10,000 tons ;

(c) An air force, including any naval air arm, of 60 aircraft, including reserves, with a total personnel strength of 3,000. Finland shall not possess or acquire any aircraft designed primarily as bombers with internal bomb-carrying facilities.

These strengths shall in each case include combat, service and overhead personnel.

Article 15.

Personnel not included in the Finnish Army, Navy or Air Force shall not receive any form of military training, naval training or military air training as defined in Annex II.

Article 16.

1. As from the coming into force of the present Treaty, Finland will be invited to join the Barents, Baltic and Black Sea Zone Board of the International Organisation for Mine Clearance of European Waters and shall maintain at the disposal of the Central Mine Clearance Board of all Finnish

minesweeping forces until the end of the post-war mine clearance period, as determined by the Central Board.

2. During this post-war mine clearance period, Finland may retain additional naval units employed only for the specific purpose of mine-sweeping, over and above the tonnage permitted in Article 13.

Within two months of the end of the said period, such of these vessels as are on loan to the Finnish Navy from other Powers shall be returned to those Powers, and all other additional units shall be disarmed and converted to civilian use.

3. Finland is also authorised to employ 1,500 additional officers and men for minesweeping over and above the numbers permitted in Article 13. Two months after the completion of minesweeping by the Finnish Navy, the excess personnel shall be disbanded or absorbed within the numbers permitted in the said Article.

BRITISH AND FOREIGN NAVIES.

PRINCIPAL OFFICIALS.

On January 1, 1947.

GREAT BRITAIN.

Board of Admiralty.

First Lord.—The Right Honourable Viscount Hall.

First Sea Lord and Chief of Naval Staff.—Admiral Sir John H. D. Cunningham, G.C.B., M.V.O.

Second Sea Lord and Chief of Naval Personnel.—Admiral Sir A. J. Power, G.B.E., K.C.B., C.V.O.

Third Sea Lord and Controller.—Vice-Admiral C. S. Daniel, C.B., C.B.E., D.S.O.

Fourth Sea Lord and Chief of Supplies.—Vice-Admiral Sir Douglas B. Fisher, K.B.E., K.C.B.

Fifth Sea Lord (Air).—Vice-Admiral Sir Phillip L. Vian, K.C.B., K.B.E., D.S.O.

Vice-Chief of Naval Staff.—Vice-Admiral Sir Rhoderick B. McGrigor, K.C.B., D.S.O.

Deputy Chief of Naval Staff.—Rear Admiral Robert Don Oliver, C.B.E., D.S.C.

Parliamentary and Financial Secretary.—John Dugdale, M.P.

Civil Lord.—W. J. Edwards, M.P.

Permanent Secretary.—J. G. Lang, C.B.

FOREIGN POWERS.

Country.	Minister of Marine.	Chief of Staff.
Argentina . .	Rear-Admiral Fidel L. Anadon	Rear-Admiral Juan M. Carranza
Belgium . .	M. Van Acker (Minister of Communications)	Commodore Timmermans
Brazil . .	Vice-Admiral Sylvio de Naronha	Vice-Admiral A. Lara de Almeida
Bulgaria . .	Major-General Velcheff (Minister of War)	—
Chile . .	Vice-Admiral Vicente Merino	Rear-Admiral Immanuel Holgar
China . .	C.-in-C. Navy General Chen Cheng; Deputy C.-in-C. Navy General Kuei Yung-Ching (Acting Admiral)	Rear-Admiral Chou Hsien-Chang
Columbia . .	Lt.-Commander Aureliano Castro (Director-General of Navy)	—
Cuba . .	Señor Menendez Villock	Rear-Admiral S. Aguila Ruiz
Ecuador . .	Captain Eduardo Sauchez (Director-General of Navy)	—
France . .	M. Jacquilot	Vice-Admiral A. G. Lemonnier
Greece . .	M. Venizelos	Rear-Admiral Leonidopoulos
Hungary . .	—	—
Italy . .	Signor V. M. Stampacchia	Admiral F. Mangeri
Mexico . .	General Jara	Rear-Admiral Rodriguez Malpica
Netherlands . .	H. E. J. J. A. Schagen Van Leeuwen	Admiral C. E. L. Helfrich (C.-in-C.)
Peru . .	Captain Manuel B. Nieto	Rear-Admiral G. Bravo Arenas
Portugal . .	Captain Americo Tomas	Vice-Admiral Antonio Garcia de Sousa Ventura (Major-General of Armada)
		Rear-Admiral Correia Pereira (Chief of Naval Staff)
Roumania . .	Rear-Admiral Cristescu (Director of Naval Secretariat, Ministry of National Defence)	—
Spain . .	Rear-Admiral Regalado Rodriguez	Admiral A. Arriaga Adam
Turkey . .	—	Admiral Ozdenis
United States . .	James V. Forrestal (Secretary of the Navy)	Fleet-Admiral Chester W. Nimitz (Chief of Naval Operations)
Uruguay . .	Rear-Admiral Gustavo Schroeder	Captain Juan Battione
U.S.S.R. . .	N. G. Kuznetsov, Deputy to the Minister of Armed Forces and C.-in-C. Navy, Admiral of the Fleet	Admiral A. G. Golovko
Venezuela . .	Commander Gutierrez (Inspector-General of the Navy)	—
Yugoslavia . .	Marshal Tito (Minister of National Defence)	Rear-Admiral Manola

BRITISH NAVAL MISSIONS IN FOREIGN COUNTRIES.

On January 1, 1947.

British Representative on Military Staff of Security Council, U.N.O.	Admiral Sir Henry R. Moore, G.C.B., C.V.O., D.S.O.
Chief of Staff to British Representative.	Rear-Admiral W. R. Slayter, C.B., D.S.O., D.S.C.
British Naval Mission to Greece	
Head	Rear-Admiral A. G. Talbot, D.S.O.
Chief Staff Officer	Captain L. G. Sinker, D.S.C., R.N.
British Naval Mission to Denmark	
Head	Captain D. B. Wyburd, D.S.O., D.S.C., R.N.
Naval Adviser to Royal Netherlands Navy	Rear-Admiral J. W. A. Waller, C.B.

BRITISH AND FOREIGN NAVAL ATTACHÉS.

On January 1, 1947.

BRITISH NAVAL ATTACHÉS ACCREDITED TO FOREIGN COUNTRIES.

To.	Name.	Appointed.	Headquarters.
Argentina and Uruguay	Captain the Hon. V. M. Wyndham-Quin, R.N.	March, 1945	Buenos Aires
Brazil	Captain H. A. Simpson, O.B.E., D.S.C., R.N.	Dec., 1944	Rio de Janeiro
Chile and Peru	Captain W. G. Brittain, C.B.E., R.N.	Oct., 1946	Santiago
China.	Captain H. Dalrymple-Smith, R.N.	Aug., 1946	Nanking
	Assistant: Commander N. K. Tod, D.S.C., R.N.	Aug., 1946	Shanghai
France	Rear-Admiral R. Shelley, C.B., C.B.E.	March, 1945	Paris
	Assistants: Commander E. N. Pumphrey, D.S.O., D.S.C., R.N.	May, 1946	"
	Commander (E.) R. S. Hawkins, R.N.	Dec., 1946	"
Netherlands	Captain R. E. Jeffreys, D.S.C., R.N.	Sept., 1945	The Hague
Norway	Captain I. R. H. Black, R.N.	Oct., 1946	Oslo
Poland	Captain C. H. Petric, D.S.O., R.N.	Nov., 1945	Warsaw
Portugal	Commander J. W. McClelland, D.S.O., R.N.	Aug., 1946	Lisbon
Spain	Commander C. H. de B. Newby, R.N.	Sept., 1946	Madrid
Sweden	Captain H. M. Denham, C.M.G., R.N.	May, 1940	Stockholm
Turkey	Captain J. S. Crawford, D.S.O., R.N.	Oct., 1946	Ankara
	Assistants: Commander (E.) F. L. Tewkesbury, R.N.	Oct., 1944	"
	Lieutenant-Commander E. C. B. Mares, R.N.V.R.	Jan., 1945	Istanbul
U.S.A., Panama, Cuba, Mexico, Guatemala, Honduras, Nicaragua, Salvador, Costa Rica	Captain P. W. W. Wootton, R.N.	July, 1946	Washington
	Assistants: Commander (E.) F. G. S. Bowring, R.N.	Feb., 1946	"
	(Air) Commander C. L. G. Evans, D.S.O., D.S.C., R.N.	June, 1946	"
(Above countries except Panama.)	Assistant: Commander L. B. Whetstone, R.N.	Feb., 1946	Mexico City
U.S.S.R.	Captain D. C. Hill, D.S.O., R.N.	Jan., 1946	Moscow
Venezuela, Colombia, Ecuador, Hayti, Dominican Republic	Commander J. A. Agnew, R.N.	Dec., 1946	Caracas
Yugoslavia	Captain A. E. P. Welman, D.S.O., D.S.C., R.N.	June, 1945	Belgrade

FOREIGN NAVAL ATTACHÉS ACCREDITED TO GREAT BRITAIN.

Argentina : Captain Theodore E. Hartung.
Belgium : Lieutenant-Colonel Andre Bigwood (Military Attaché).
Brazil : Vice-Admiral Alfredo Carlos Soares Dutra.
Chile : Commander Hernan Cubillos.
China : Commander Chen Hsun-Yin (Acting Naval Attaché).
Czechoslovakia : Colonel Jaroslav Plass (Military and Air Attaché).
Denmark : Captain E. J. C. Qvistgaard, R.Dan.N. (Naval and Air Attaché).
France : Rear-Admiral L. M. P. A. Sala, C.B.E., D.S.O.
Greece : Captain E. Georgeacopoulos, R.H.N.
Mexico : Lieutenant-Commander Jose H. Orozco Silva.
Netherlands : Captain J. B. de Meester.
Norway : Commodore J. E. Jacobsen, O.B.E.
Peru : Commander Don Carlos Granadino.
Poland : Captain Jerzy Klosowski.
Portugal : Commander Jose Conceicao da Rocha.
Soviet Union : Commodore Vassili D. Yakovlev, C.B.E. (Naval Attaché and Naval Attaché for Air).
Spain : Lieutenant-Commander Don Mariano Urzaiz, Duke of Luna.
Sweden : Captain J. E. Gester.
Turkey : Captain Aziz Ulsan.
U.S.A. : Commodore Tully Shelley, C.B.E., U.S.N.
Uruguay : Post vacant.
Yugoslavia : Lieutenant-Colonel Vangel Cukalevski.

PICTORIAL SECTION

PICTORIAL SECTION

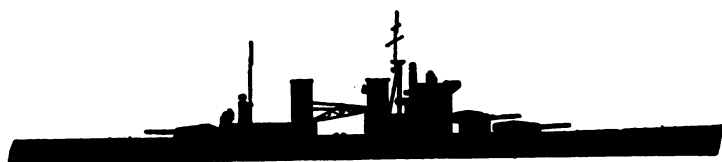
SILHOUETTES OF WARSHIPS.

CAPITAL SHIPS.

[Dimensions and particulars of British and foreign warships will be found on pp. 166-263. All the profiles are drawn to the scale $\frac{1}{4}$ in. = 100 ft.]
[An Index to the names of vessels of which profiles are included in this section are given at the end of the volume.]



GREAT BRITAIN. Battleship. Vanguard.



GREAT BRITAIN. Battleships. King George V., Duke of York, Howe, Anson.
 Tripod mainmast.



GREAT BRITAIN. Battleships. Nelson, Rodney.
 Mast structure increased.



GREAT BRITAIN. Battleships. Warspite, Queen Elizabeth, Valiant.



GREAT BRITAIN. Battleships. Ramilies, Resolution, Revenge.
U.S.S.R. Battleship. Archangel (ex-Royal Sovereign).

CAPITAL SHIPS.



GREAT BRITAIN. Battle-cruiser. Renown.



UNITED STATES. Battleships. Iowa, Missouri, New Jersey, Wisconsin, Kentucky.
(Kentucky will be different when re-armed.)



UNITED STATES. Battleships. Alabama, Indiana, Massachusetts, South Dakota.



UNITED STATES. Battleships. Washington, North Carolina.



UNITED STATES. Battleships. Idaho, Mississippi, New Mexico.



UNITED STATES. Battleship. West Virginia.



UNITED STATES. Battleship. Pennsylvania.
Tripod mainmast replaced by built up structure.



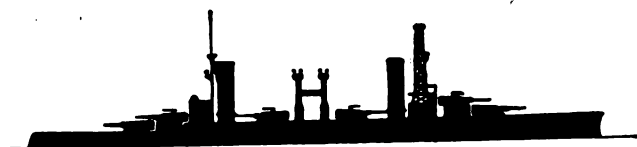
UNITED STATES. Battle-cruisers. Alaska, Guam, Hawaii.
(Hawaii will be different when re-armed.)



FRANCE. Battleship. Richelieu.



FRANCE. Battleship. Lorraine.



ARGENTINA. Battleships. Moreno, Rivadavia.
Guns on B and X turrets replaced by range-finders.



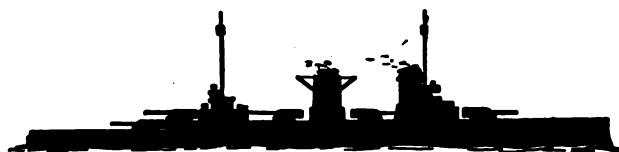
BRAZIL. Battleships. Minas Geraes, São Paulo.



CHILE. Battleship. Almirante Latorre.
(Modernised 1931—mainmast raised and bridgework altered.)
Oatapult fitted on quarter deck.



ITALY. Battleships. Giulio Cesare, Andrea Doria, Carlo Duilio.
Modified bridgework and pole mainmast in Doria and Duilio.



TURKEY. Battle-cruiser. Yavuz Sultan Selim.



SOVIET UNION. Battleships. Marat, Paris Commune and October Revolution.
Two derricks fitted between mainmast and turret in Marat and Paris Commune.
Crane fitted abreast mainmast in October Revolution.

AIRCRAFT AND SEAPLANE CARRIERS AND TENDERS.



GREAT BRITAIN. Aircraft Carrier. Illustrious, Victorious, Formidable Indomitable.



GREAT BRITAIN. Light Fleet Carrier. ("Colossus" class.)

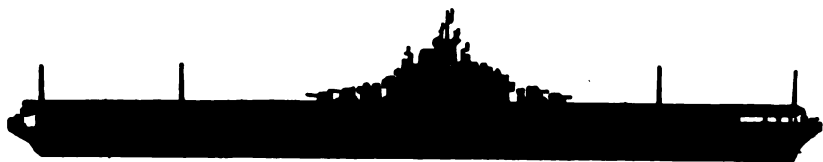


GREAT BRITAIN. Aircraft Carrier. Furious.

Three wireless masts added each side of flight deck.
Quarter deck has been raised one deck.
Deck forward has been levelled and sides blanked off.
Superstructure, polemast and spotting top fitted amidships.



UNITED STATES. Aircraft Carriers. Midway, Franklin D. Roosevelt, Coral Sea.



UNITED STATES. Aircraft Carrier. ("Essex" class.)



UNITED STATES. Aircraft Carrier. Enterprise.



UNITED STATES. Aircraft Carrier. Ranger.
(NOTE.—Funnels hinge outboard.)



UNITED STATES. Light Aircraft Carrier. ("Salpan" class.)



UNITED STATES. Light Aircraft Carrier. ("Independence" class.)



UNITED STATES. Escort Carrier. ("Commencement Bay" class.)



UNITED STATES. Escort Carrier. ("Bogue" class.)



FRANCE. Light Fleet Carrier. Arromanches.

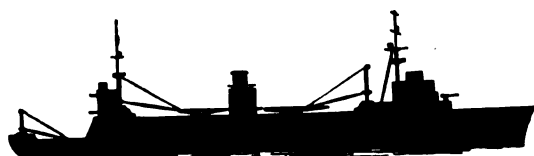


FRANCE. Escort Carrier. Dixmude.



FRANCE. Aircraft Transport. Béarn.

Space between flight deck and upper deck forward partially blanked off.
Framework fitted on aft side of funnel.



FRANCE. Aviation Transport. Commandant Teste.

CRUISERS AND COAST DEFENCE SHIPS.



GREAT BRITAIN. Cruiser. London.



GREAT BRITAIN. Cruisers. Devonshire, Sussex. ("Norfolk" class.) Norfolk.
Fore topgallant mast added.

ROYAL AUSTRALIAN NAVY. Cruiser. Shropshire.



GREAT BRITAIN. Cruisers. ("Kent" class.) Cumberland, Suffolk, Kent, Berwick.

Kent and Berwick are flush-decked.

ROYAL AUSTRALIAN NAVY. Cruiser. ("Kent" class.) Australia.
No hangars fitted.



GREAT BRITAIN. Cruisers. ("Fiji" class.) Ceylon, Jamaica, Gambia, Uganda, Kenya, Mauritius, Nigeria, Newfoundland.



GREAT BRITAIN. Cruiser. (Improved "Southampton" class.) Belfast.
Aircraft removed.



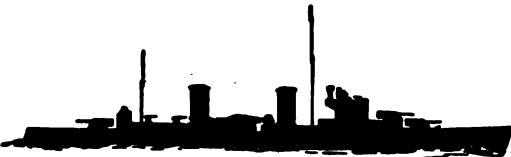
GREAT BRITAIN. Cruisers. ("Southampton" class.) Newcastle, Sheffield, Birmingham, Glasgow, Liverpool.
Aircraft removed.



ROYAL AUSTRALIAN NAVY. Cruiser. Modified "Leander" class.) Hobart.
Aircraft removed.



GREAT BRITAIN. Cruisers. ("Leander" class.) Leander, Achilles, Orion, Ajax.



GREAT BRITAIN. Cruisers. ("Arethusa" class.) Arethusa, Aurora.
Derrick fitted on aft side of after funnel.



GREAT BRITAIN. Anti-Aircraft Cruisers. ("Carlisle" class.) Colombo, Capetown.
Tripod mainmast. Delhi now similar, but with sheer on forecastle.



GREAT BRITAIN. Cruisers. Frobisher, Hawkins.
Second funnel added.



GREAT BRITAIN. Cruisers. ("Dido" class.)



**GREAT BRITAIN. Cruiser Minelayer. Adventure. (Stern has been extended.)
Derricks added abreast masts.**



UNITED STATES, Cruiser. Oregon City.



UNITED STATES. Cruisers. ("Baltimore" class.)

Note. These ships are the same length as "Oregon City" above, not as shown.



UNITED STATES. Cruiser. Wichita.

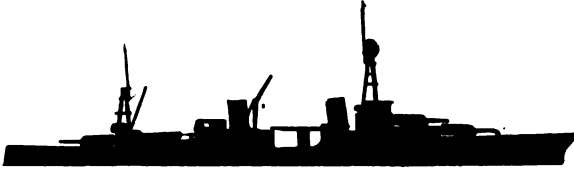


**UNITED STATES. Cruisers. ("New Orleans" class.) New Orleans, Minneapolis,
San Francisco, Tuscaloosa.**



UNITED STATES. Cruisers. Portland.

Mainmast moved to fore side of after funnel.



UNITED STATES. Cruisers. ("Chester" class.) Chester Louisville, Augusta.



UNITED STATES. Cruiser. ("Cleveland" Class.)



UNITED STATES. Cruiser. ("Fargo" Class.)



UNITED STATES. Cruisers. Boise, Brooklyn, Honolulu, Nashville, Philadelphia, Phoenix, Savannah, St. Louis.



UNITED STATES. Cruiser. ("San Diego" Class.)



FRANCE. Cruisers. ("Duquesne" class.) Duquesne, Tourville and Suffren.



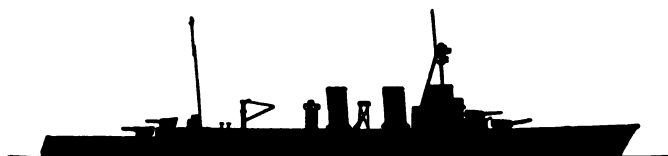
FRANCE. Cruisers. Gloire, Montcalm, Georges Leygues.



FRANCE. Training Cruiser. Jeanne d'Arc.



FRANCE. Cruiser Minelayer. Emile Bertin.



FRANCE. Cruiser. Duguay-Trouin.
Catapult fitted on quarter deck.
Fore topmast removed and mast head modified.



FRANCE. Light Cruiser. "Le Malin" class.)



FRANCE. Light Cruisers. Cassard, Vauquelin, Korsaint, Tartu, Le Chevalier
Paul, Aigle, Albâtre, Epervier, Milan, Gerfaut, Vautour.



FRANCE. Light Cruisers. Tigre, Léopard, Lynx.
Platform added before after turret.



ARGENTINA. Cruiser. La Argentina.



ARGENTINA. Cruisers. Almirante Brown, Vintimille de Mayo.
Derrick fitted on fore side of mainmast.
Superstructure built on aft side of mainmast.



DENMARK. Cruiser. Niels Juel.



GREECE. Cruiser. Giorgos Averoff.



ITALY. Cruisers. Luigi di Savoia, Giuseppe Garibaldi.



ITALY. Cruisers. ("Atendole" class.) Eugenio di Savoia, Filiberto Dusa d'Aceto.



ITALY. Cruiser. Montecuccoli.



ITALY. Cruiser. Luigi Cadorna.



NETHERLANDS. Cruiser. Tromp.



NORWAY. Minesweeping and Training Ship. Olav Trygvason.
Both cranes are fitted abreast mainmast.



SPAIN. Cruiser. Canarias.
Masts removed.



SPAIN. Cruisers. Galicia, Almirante Cervera, Miguel de Cervantes.
The mainmasts are tripods.
Fore topmast and topgallant mast removed.



SPAIN. Cruiser. Navarra (ex-Republica).



SPAIN. Light Cruiser. Mendez Núñez.
Foremast is tripod. Fore topgallant mast added.
A.A. armament fitted between second funnel and mainmast.
Searchlight platform fitted round after funnel.



SWEDEN. Aircraft Cruiser. Gotland.
Has been reconstructed as A.A. cruiser.



SWEDEN. Coast Defence Ship. Gustav V.
Mainmast and derrick removed.



SWEDEN. Coast Defence Ship. Sverige.



SWEDEN. Coast Defence Ship. Drottning Victoria.



**SWEDEN. Battleship. Oscar II.
Mainmast removed.**



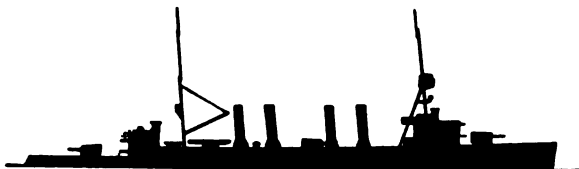
SOVIET UNION. Cruiser. Preflintov. (New Krasny Krym).



**SOVIET UNION. Cruiser. Krasni Kavkaz.
Catapult fitted between mainmast and funnel.
A.A. guns fitted between funnels.**



SOVIET UNION. Cruiser. Admiral Makaroff.



SOVIET UNION. Scout Cruisers. ("Omaha" Class.) Murmansk (ex-Milwaukee).



SOVIET UNION. Armoured Gunboat. Vainionlinna.

FLOTILLA LEADERS AND DESTROYERS.



GREAT BRITAIN. Destroyers. "Battle" class.



GREAT BRITAIN. Destroyers. "Zephyr" class.



GREAT BRITAIN. Destroyers. "Hunt" class.
Also serving with Greek, Chinese and Norwegian navies.



GREAT BRITAIN. Destroyers. "Javelin" and "Kelly" classes.



GREAT BRITAIN. Destroyers. "Tribal" class.
Pole mainmast.
Also serving with R.A.N. and R.C.N.



GREAT BRITAIN. Destroyers. "Greyhound," "Hare" and "Intrepid" classes.
Mainmast shortened.



GREAT BRITAIN. Flotilla Leader. Faulkner.
Pole mainmast.



GREAT BRITAIN. Destroyers. "Eclipse" and "Fearless" classes similar but gun between funnels omitted.



GREAT BRITAIN. Destroyers. "Acosta," "Boada," and "Defender" classes.
"Acosta" class has davits at stern.



GREAT BRITAIN. Flotilla Leaders. Keppel, Douglas, Campbell, Mackay, Malcolm, Montrose.



GREAT BRITAIN. Destroyers. Admiralty "V" class.

ROYAL AUSTRALIAN NAVY. Flotilla Leader. Stuart.

SPAIN. Flotilla Leaders. Almirante Valdes, etc., generally similar.



UNITED STATES. Destroyers. "Sumner" class (long hull).



UNITED STATES. Destroyers. "Sumner" class (short hull).



UNITED STATES. Destroyers. "Fletcher" class.



UNITED STATES. Destroyers. "Benson" class.



UNITED STATES. Destroyers. "Bagley" class.



UNITED STATES. Destroyers. "Gridley" class.



UNITED STATES. Destroyers. "Cummings" class (late "Mahan" Class.)



UNITED STATES. Destroyers. "Somers" class.



UNITED STATES. Destroyers. "Parrott" class.



UNITED STATES. Destroyers. Dunlap, Fanning.



FRANCE. Destroyers. Mistral, Ouragan, Simoun, Tempête, Tramontane, Typhon, Trombe, Tornade.



FRANCE. Destroyer. Decaix.

POLAND. Destroyer. Burza is similar. Mainmast shortened.



ARGENTINA. Flotilla Leaders. Mendoza, La Rioja, Tucuman.



CHILE. Destroyers. Serrano, Orella, Riquelme, Hyatt, Videla, Aldas. Mainmast heightened.



DENMARK. Torpedo Boats (1st Class). Glentien Høgen, Ornen, Løxus, Drøgen, Hvalen.



GREECE. Destroyers. Spetzai and Goursiella.



ITALY. Nicoletto da Recco.



ITALY. Destroyer. A. Oriani.



ITALY. Flotilla Leader. Augusto Riboty.



POLAND. Destroyer. Strykawka.



PORTUGAL. Destroyers. Vouga, Lima, Dao, Tejo, Douro.

COLOMBIA. Destroyers. Antioquia, Caldas.



SWEDEN. Destroyers. Klas Horn, Klas Uggla, Ehrensköld, Nordenfjeld. Davit fitted at stern.



SOVIET UNION. Destroyers. "Leningrad" class.

SOVIET UNION. Destroyers. See also silhouettes of French "Desaix" class (ex-German).



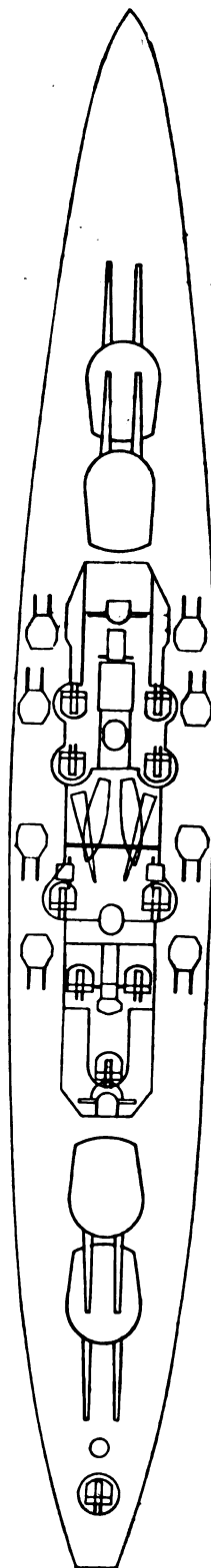
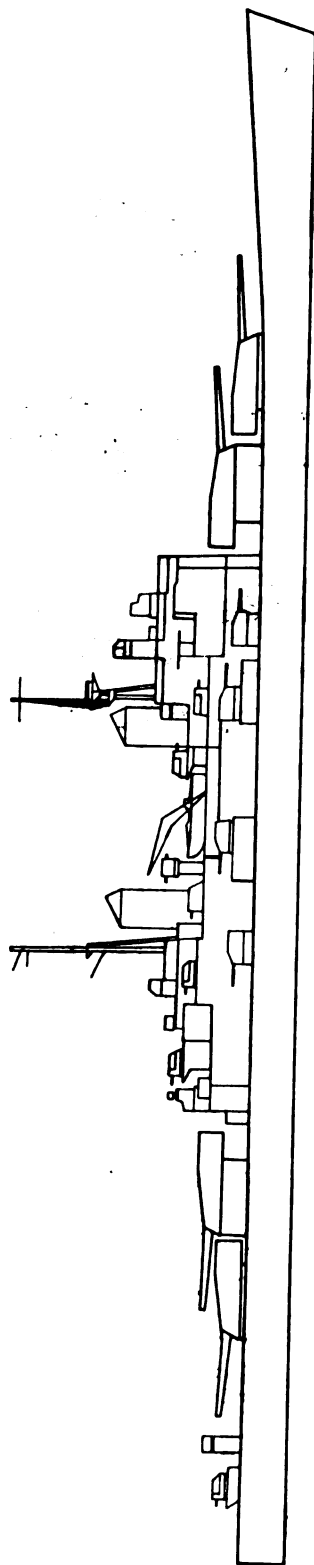
SOVIET UNION. Destroyers. "Stromlitel" class.

PICTORIAL SECTION PLANS AND ELEVATIONS OF WARSHIPS.

GREAT BRITAIN.

BATTLESHIPS.

Vanguard.



Length 814 ft.; 42,500 tons; Completed 1946.
Armament, 8—16-in.; 16—6.35; many smaller A.A.

GREAT BRITAIN.

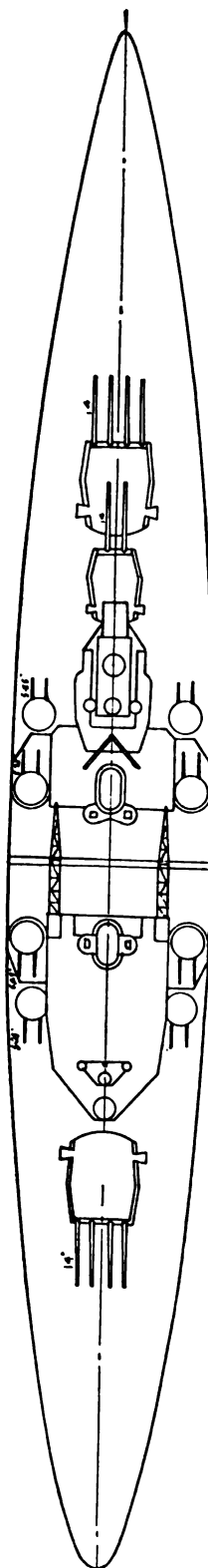
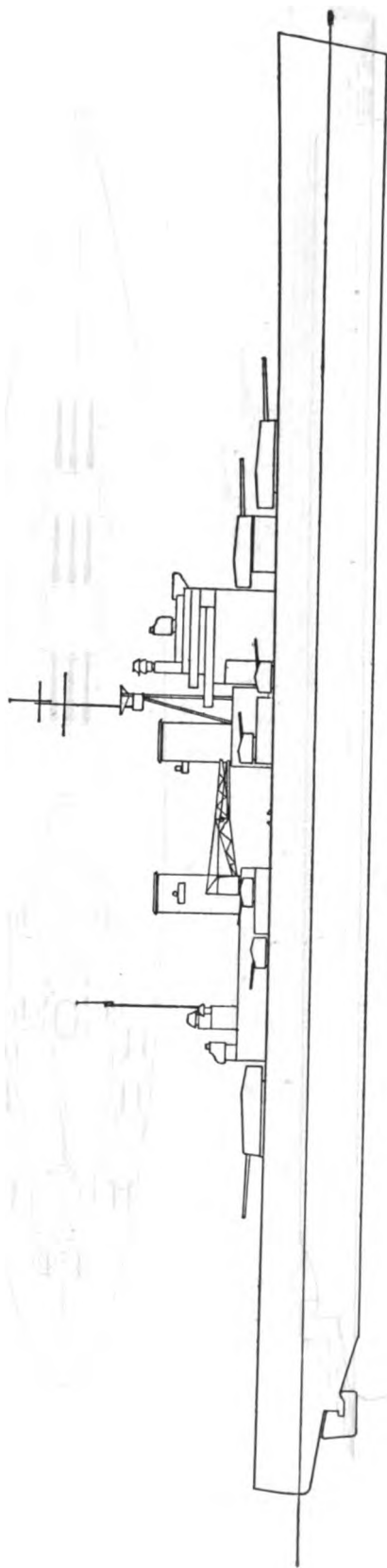
BATTLESHIPS.

King George V.

Duke of York.

Howe.

Anson.

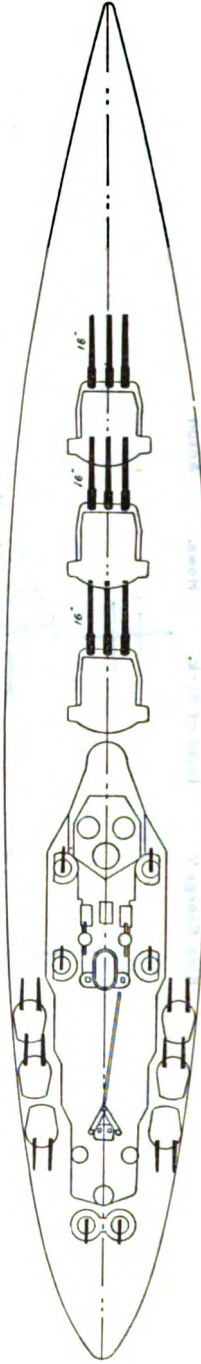
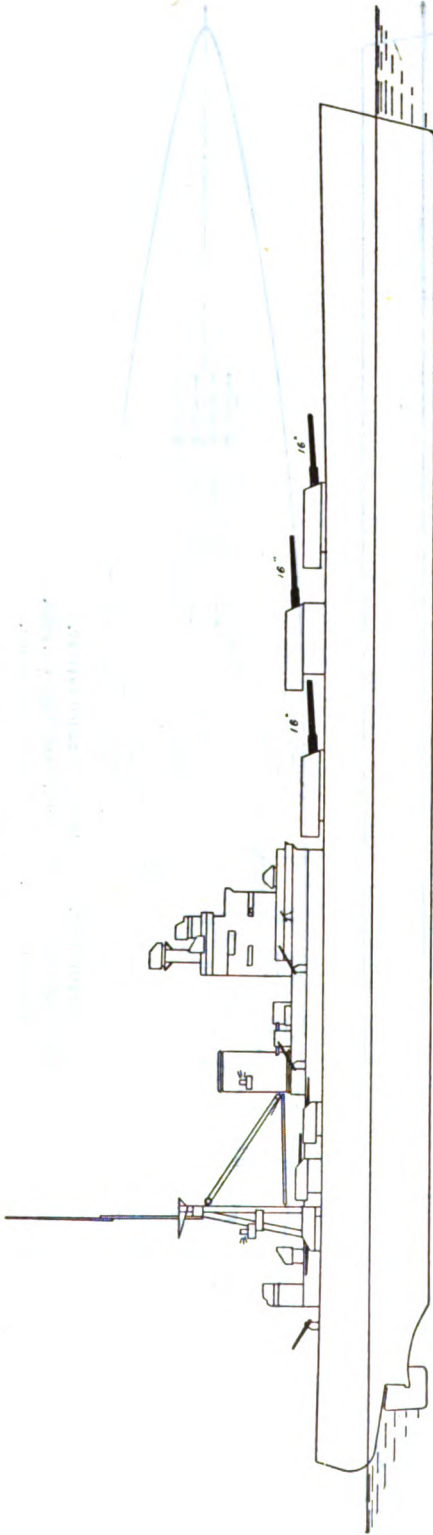


Length 745 ft.; 85,000 tons; Completed 1941-42.
Armament, 10—14-in.; 16—5.25-in.; many light A.A. guns.
Catapult removed. Deck raised between funnels.

GREAT BRITAIN.

BATTLESHIPS.

Nelson. Rodney.



Length (extreme) 710 ft.; 33,950 tons; Speed, 23 knots; Completed, 1927.
 Armament, 9—16-in.; 12—6-in.; 6—4.7-in. A.A.; many light A.A. guns; 2—24-in. submerged torpedo tubes.

NOTE.—A 14-in. waterline armour belt extends from approximately the foremost 16-in. turret to approximately the aftermost 6-in. turret. The turret armour varies from 16-in. to 9-in. Correction to plan.—Mass structure increased.

GREAT BRITAIN.

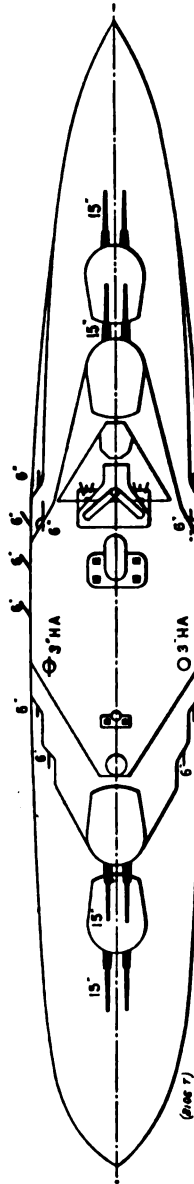
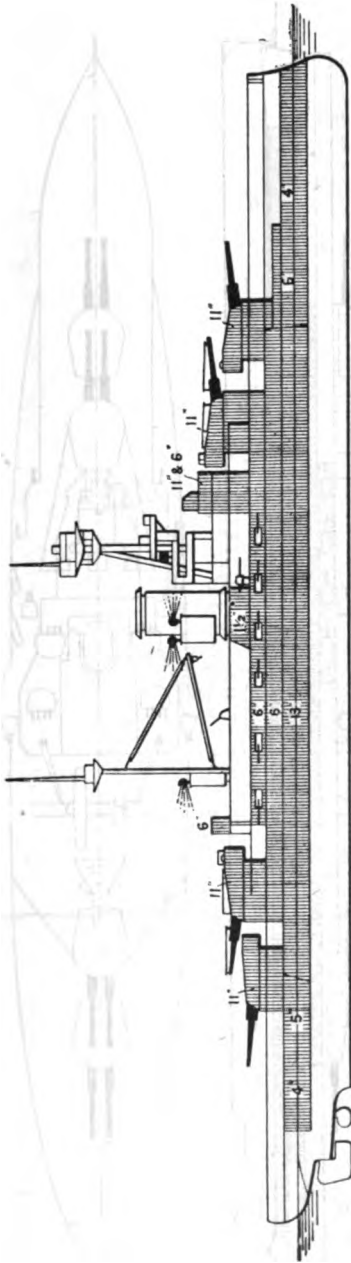
BATTLESHIPS.

† Royal Sovereign.

Revenge.

Resolution.

Ramilies;



Length (extreme) 620 ft. 6 in.; Length R.P. 560 ft.; 29,150 tons; Speed, 23 knots (without bulges); Completed, 1916-17.

Armament, 8-15-in.; 12-6-in.; 8-4-in. A.A.; 4-3-pr.; 6 M.; 11 L.; 2-21-in. submerged torpedo tubes in Revenge.

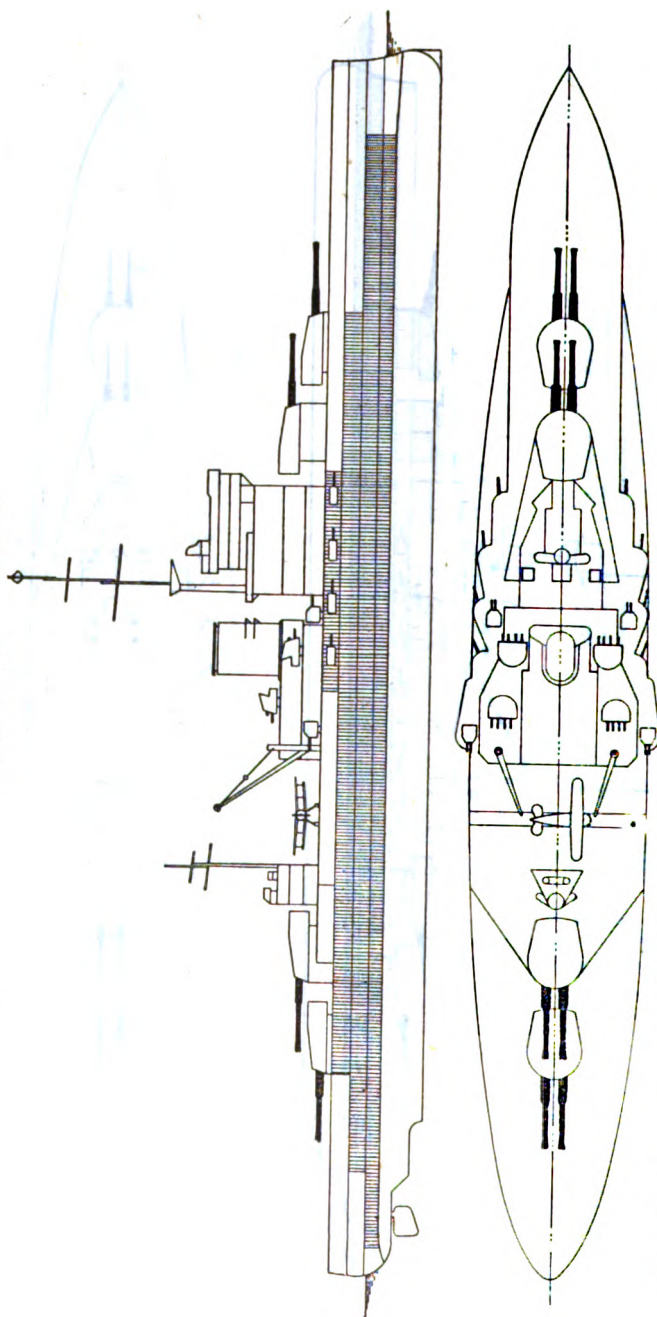
Corrections to plan.—Searchlights on mainmast and the superstructure 6-in. guns now removed. The 4-in. A.A. guns are fitted on the superstructure instead of the 8-in. H.A. shown. Fore topmast removed. Main topgallant mast fitted.

* Revenge, 625 ft. 9 in.

Royal Sovereign on loan to U.S.N. Renamed Archangel.

GREAT BRITAIN.
BATTLESHIPS.

Queen Elizabeth. Valiant.

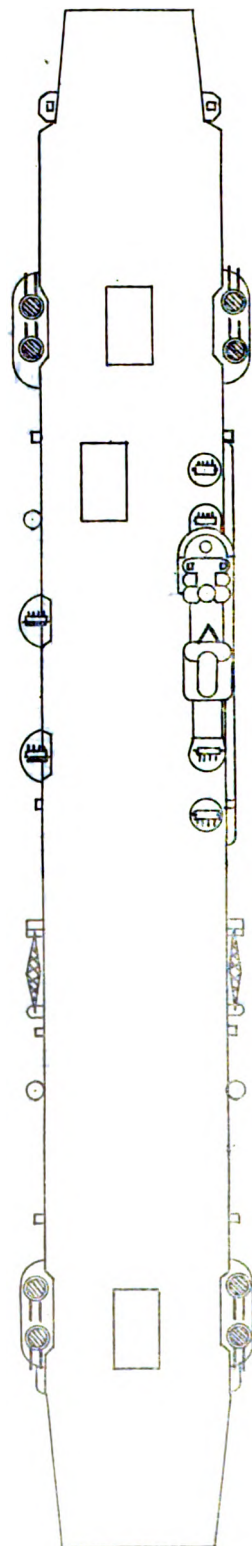
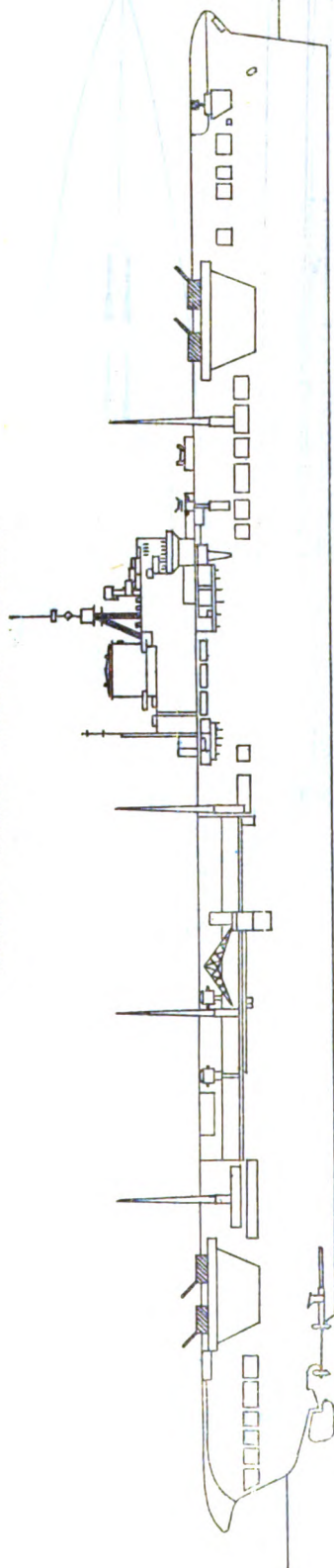


Length B.P., 600 ft.; (extreme 639 ft. 8 ins.—646 ft.); 81,100 tons; Speed, 25 knots (without bulges); Completed, 1915-1916. Modernised 1938-1940.
Armament, 8—15-in.; 20—4.5-in. 4.5-in. guns in between deck mounts.

GREAT BRITAIN.

AIRCRAFT CARRIERS.

Illustrious. Victorious. Formidable. Indomitable.

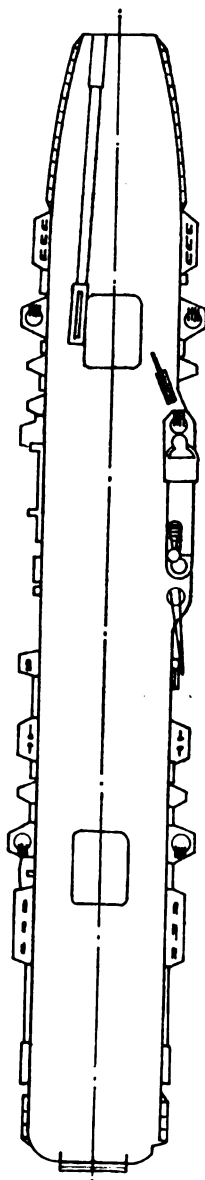
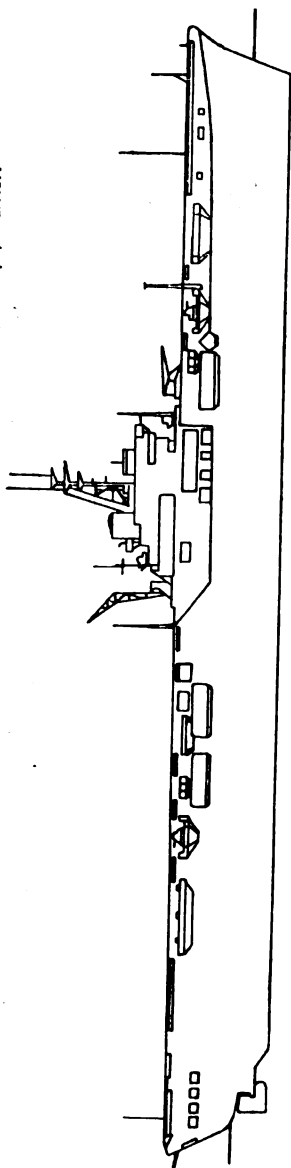


Length, 740 ft.; 23,000 tons; speed, 30½ knots.
 Illustrious completed, 1940; Victorious, 1941; Formidable, 1940; Indomitable, 1941.
 Armament 16—4.5-in. guns; 20 smaller.

GREAT BRITAIN.

LIGHT FLEET AIRCRAFT CARRIERS.

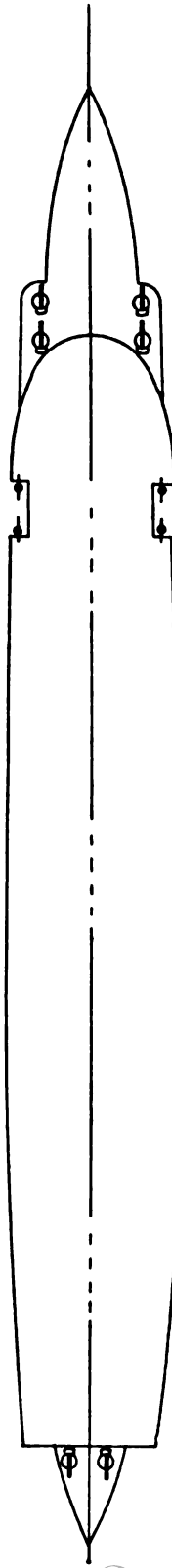
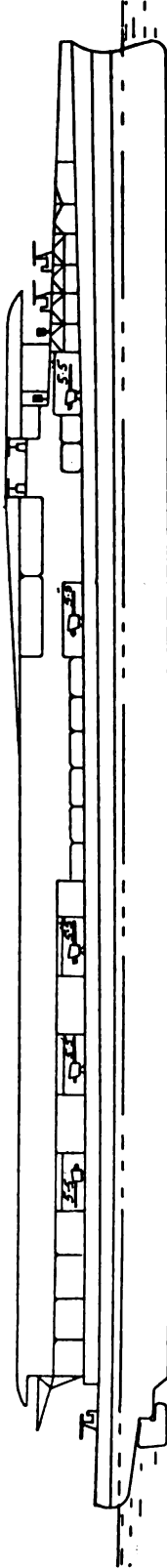
"Colossus" class. Colossus, Vengeance, Venerable, Glory, Ocean, Perseus, Theseus, Triumph, Warrior.



Length, 740 feet; 14,000 tons; Speed, 25 knots.
Armament, 6 m.p.s.; a number of light A.A. guns.
Colossus is now French ship Arromanches (on loan).

GREAT BRITAIN.
AIRCRAFT CARRIER.

Furious.



Length (extreme), 786 ft. 6 in. ; 23,450 tons; Speed, 30 knots; Completed as a cruiser, 1917; Conversion to aircraft carrier completed, 1925.

Armament, 12—4-in. ; 4—8-pr. ; 46 smaller ; 33 aircraft.

Three wireless masts added each side of flight deck. Quarter deck has been raised one deck.

Top deck forward has been levelled off and closed in.

Superstructure, polemast and spotting-top fitted amidships on the starboard side.

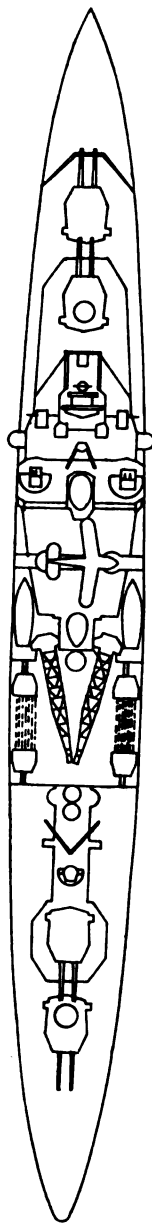
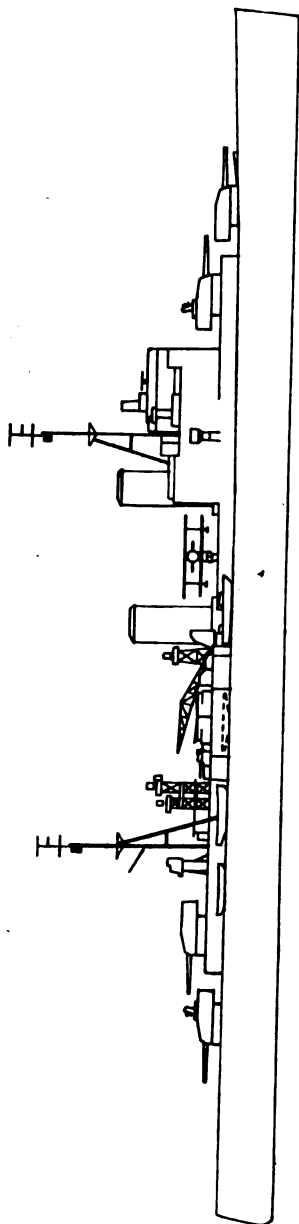
Single mounts shown replaced by twins.

GREAT BRITAIN.

CRUISERS.

"London" Class.

London.



Displacement, 10,000 tons ; length, 680 ft. ; speed, 32½ knots.
Armament, 8—8-in. ; 8—4-in. ; many smaller.

GREAT BRITAIN.

CRUISERS.

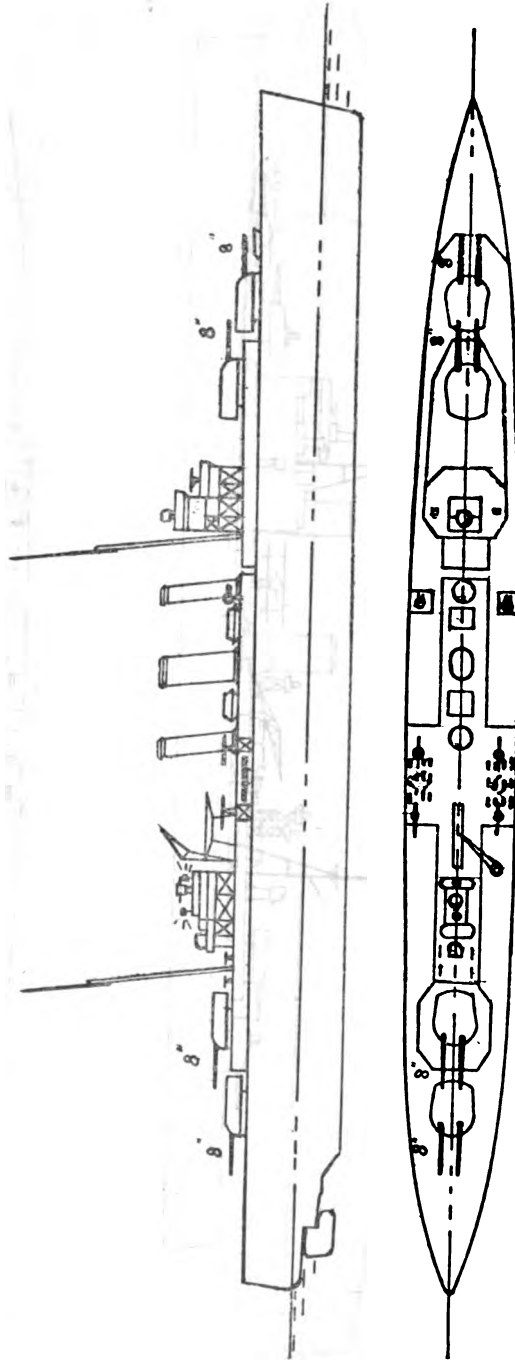
"London" Class.

Sussex. Devonshire.

Royal Australian Navy. Cruiser. Shropshire.

"Norfolk" Class.

Norfolk.



Displacement, 9,850 tons; Length (extreme), 680 ft.; Sussex and Norfolk, 633 ft.; Speed, 32½ knots. Armament, 8—8-in. 8—4-in. A.A.; many light A.A. guns; 8—21-in. torpedo tubes.

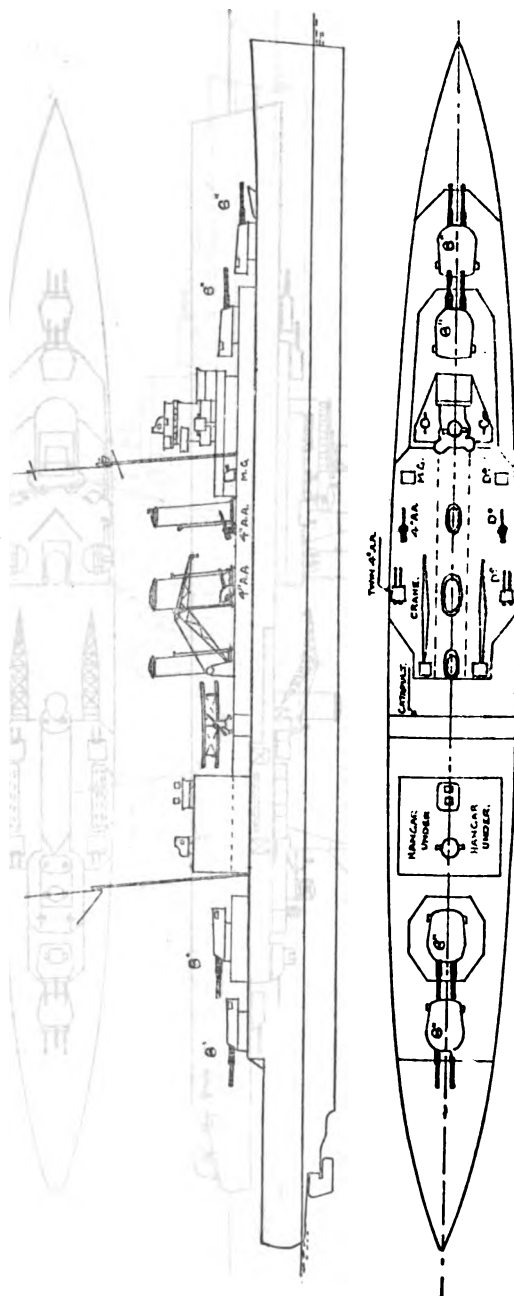
Fore topgallant mast added. Fore and main masts are tripod. Aircraft arrangements removed.

GREAT BRITAIN.

CRUISERS.

"Kent" Class.

Berwick. Kent. Cumberland. Suffolk. Australia.*
 (As reconstructed 1886-1893.)



Length (extreme), 630 ft.; 10,000 tons; Speed 31½ knots; Completed 1893. Armament, 8—8-in.; 8—4-in. A.A.
 NOTES—Berwick, Kent and Australia are flush-decked. Aircraft arrangements removed.

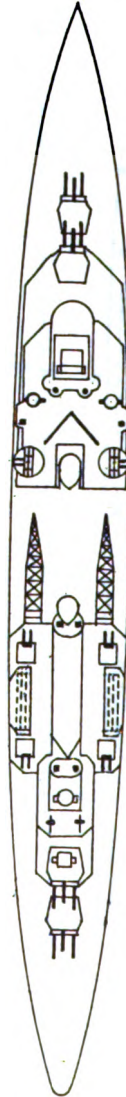
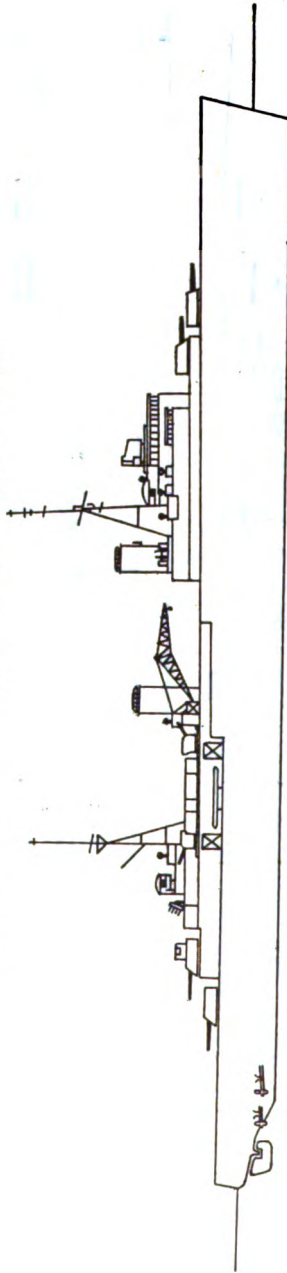
* Royal Australian Navy.

GREAT BRITAIN.

CRUISERS.

"Fiji" Class.

Bermuda. Jamaica. Mauritius. Kenya. Nigeria. Gambia.



Length (extreme), 555 ft. 6 in.; 8,000 tons; Speed, 32 knots; Completed, 1940-42.

Armament: 12—6-in.; 8—4-in. A.A.; 16 smaller.

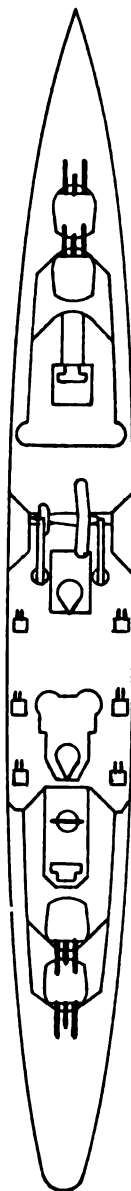
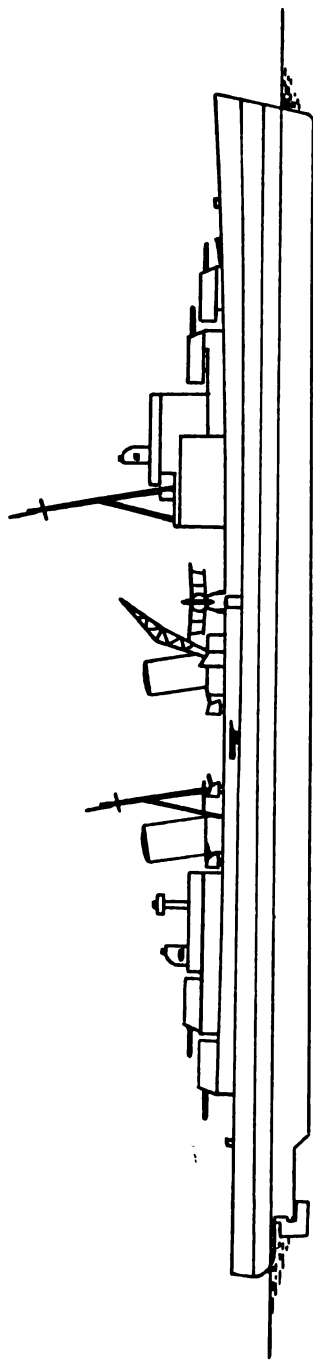
Bermuda and Jamaica have 9 6-in. Aircraft removed.

GREAT BRITAIN.

CRUISER.

Improved "Southampton" Class.

Belfast.

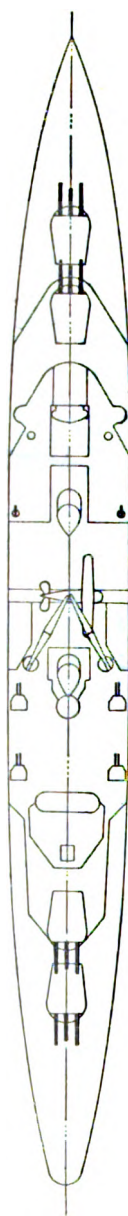
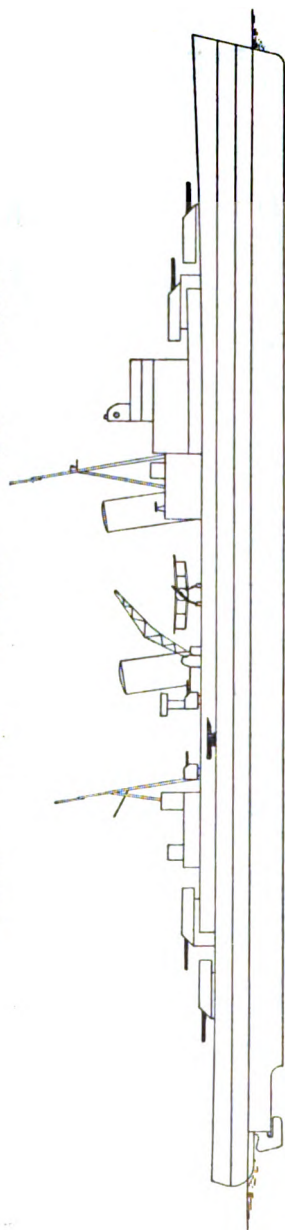


Length (extreme), 613 ft. 6 ins.; 10,000 tons; Speed, 32½ knots; Completed, 1899.
Armament: 12—6-in.; 8—4-in. A.A.; 20 smaller guns; 6 torpedo tubes.

GREAT BRITAIN.
CRUISERS.

"Southampton" Class.

Newcastle. Sheffield. Birmingham. Glasgow. Liverpool.



Length (extreme), 591 ft. 6 ins.; 9,100 tons (Liverpool 9,400 tons); Speed, 32 knots; Completed, 1937-38.

Armament, 12-6-in.; 8-4 in. A.A.; 6-21-in. torpedo tubes.

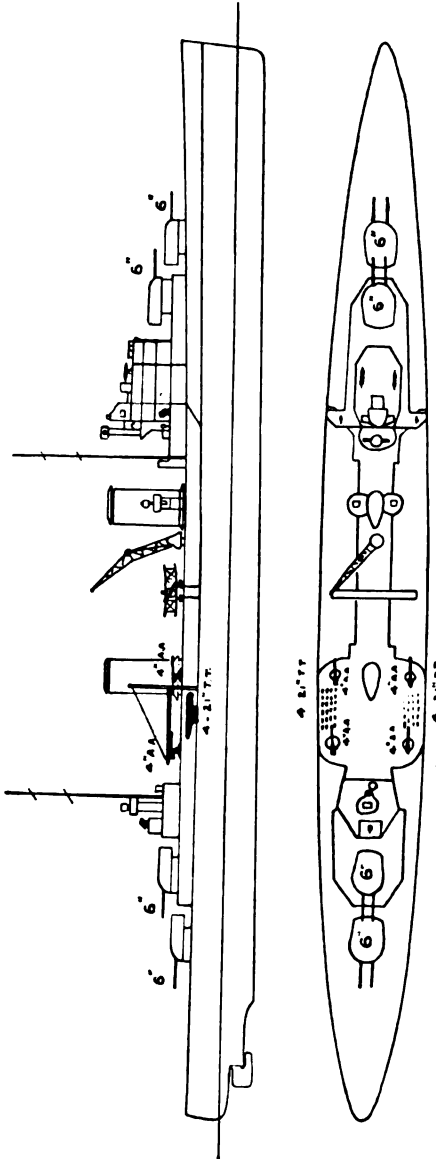
Corrections—1 6-in. turret and aircraft removed.

COMMONWEALTH OF AUSTRALIA.

CRUISER.

Modified "Leander" Class.

Hobart (ex-Apollo)



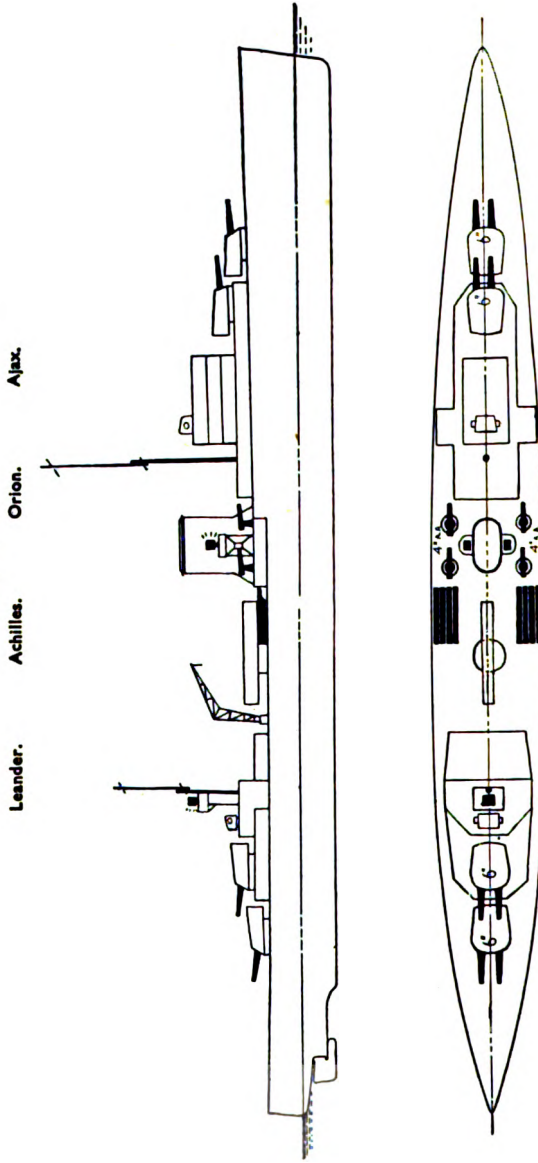
Displacement, 7,000 tons; Length (extreme), 562 ft.; Speed, 32½ knots; Completed, 1936.

Armament, 8—6-in.; 8—4-in. A.A.; 18 smaller guns; 8—12-in. torpedo tubes.

Aircraft removed.

GREAT BRITAIN.
CRUISERS.

"Leander Class."



Displacement, 6,805-7,270 tons; Length (extreme), 554 ft. 6 in.; Speed, 32½ knots. Armament, 8-6-in., 8-4-in. A.A., 4-3-pr., 8 torpedo tubes. Masts are now of tripod type. Aircraft removed.

Achilles has 6-6-in.

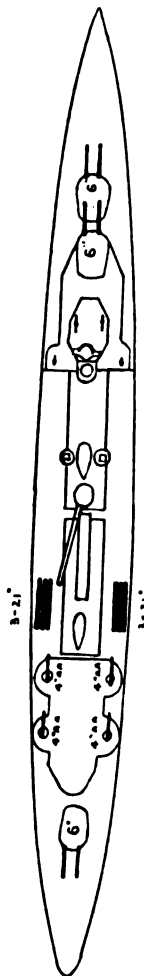
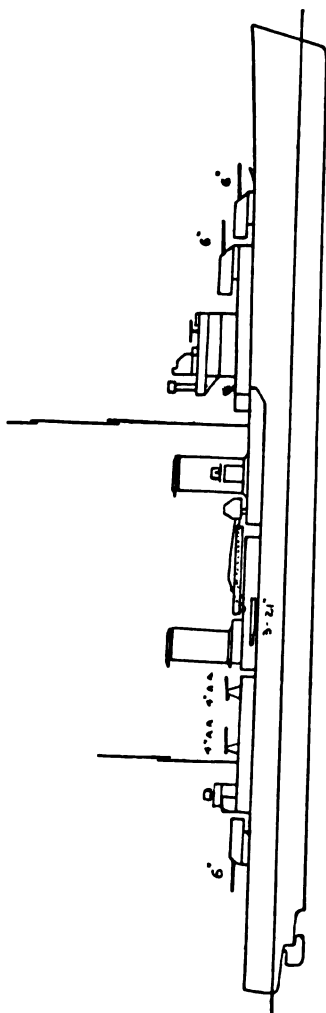
GREAT BRITAIN.

CRUISERS.

"Arethusa" Class.

Arethusa.

Aurora.



Displacement, 5,220-5,270 tons ; Length (extreme), 506 ft. ; Speed, 29 1/2 knots; Completed 1885-87.
 Armament, 6-6-in. ; 8-4-in. A.A. ; 9 smaller ; 2 triple 21-in. torpedo tubes.

4-in. guns are in twin mountings.

Masts are of tripod type. Aircraft removed.

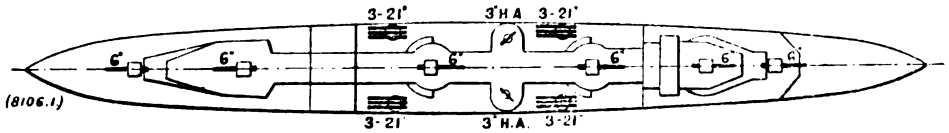
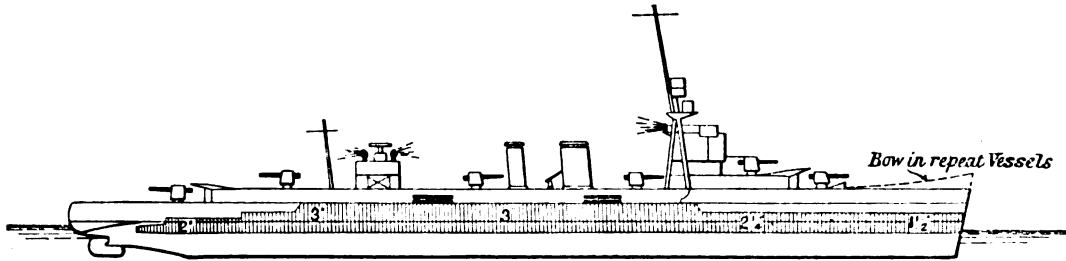
(Aurora to go to Chinese Navy.)

GREAT BRITAIN.

CRUISERS.

Repeat "D" Class.

Delhi.



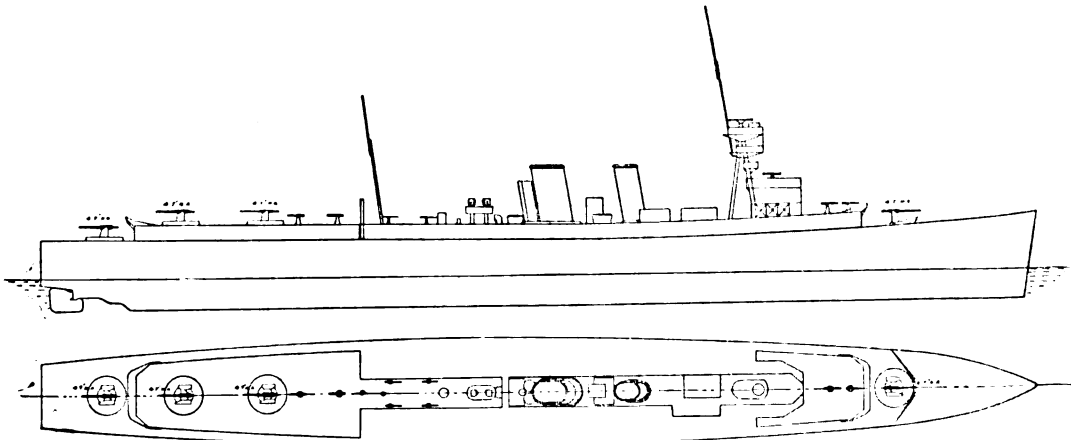
Length, 472½ ft. ; 4,850 tons ; Speed, 29 knots.

Armament, fitted as A.A. Cruiser,

Main topmast fitted. Torpedo tubes removed.

CRUISER MINELAYER

Adventure.



Length (extreme), 539 ft. ; Length B.P., 500 ft. ; 6,740 tons ; Speed, 28 knots.

Armament, 4-4-in. A.A. ; 4-3-pr. ; 4-2-pr. ; many smaller A.A. ; 310 mines.

Stern has been lengthened and rounded in plan. Derricks added abreast masts.

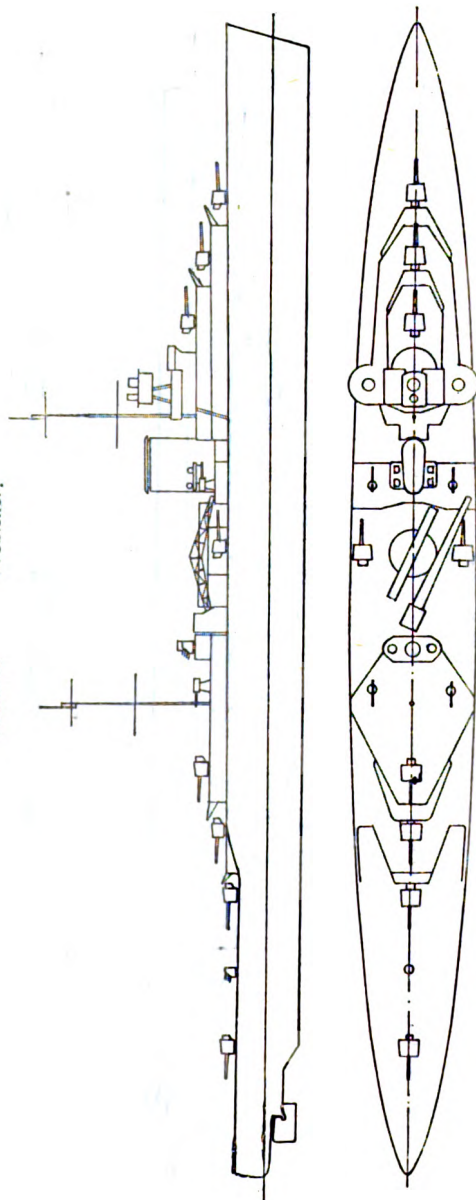
GREAT BRITAIN.

CRUISERS.

"Hawkins" Class.

Hawkins.

Frobisher.



Length (extreme), 605 ft. ; Length B.P., 565 ft. ; 9,800—9,860 tons ; Speed: Hawkins 29½ knots ; Frobisher 30½ knots.

Armament: rearmed with 6—7.5-in. ; 5—4-in. A.A. ; 2—2-pr. ; 2 M. ; 8 L. ; 4 torpedo tubes.

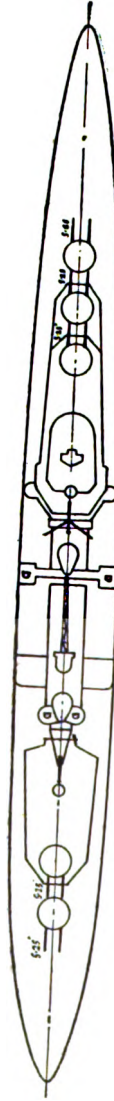
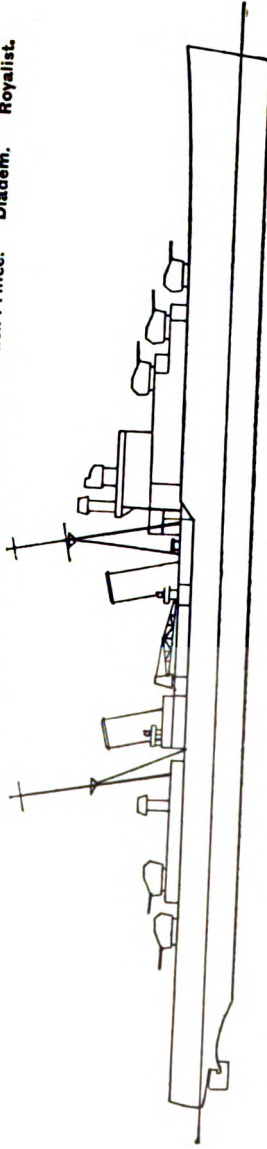
Aircraft removed.

GREAT BRITAIN.

CRUISERS.

"Dido" Class.

Cleopatra, Dido, Euryalus, Scylla, Sirius, Phœbe, Bellona, Black Prince, Diadem, Royalist.



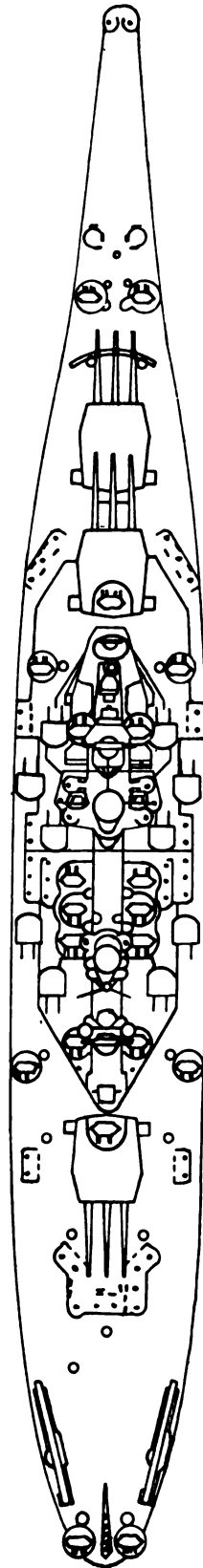
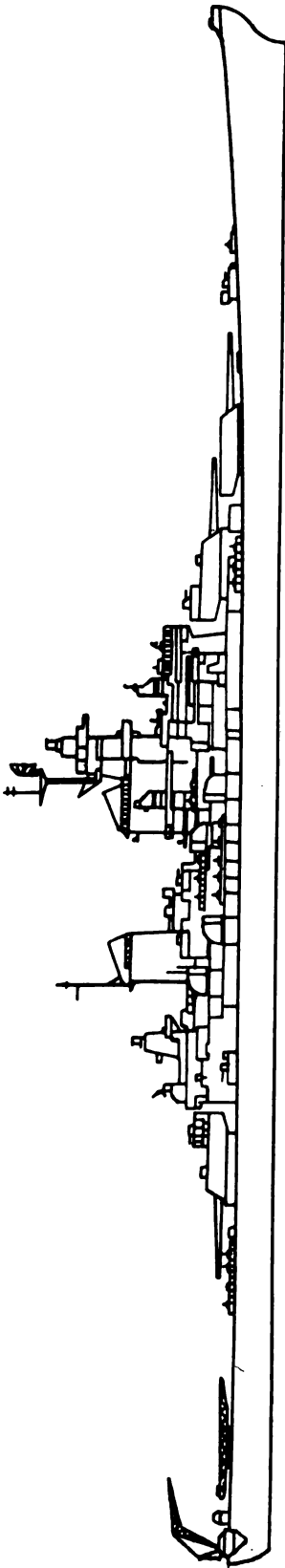
Length (extreme), 508 ft.; 5,450 tons ; Speed, 33 knots ; Completed, 1941-43.
 Armament, 8 or 10—5·25-in.; 6—21-in. torpedo tubes
 Scylla has 8 4·5-in.

UNITED STATES.

BATTLESHIPS.

"Iowa" Class.

Iowa.	Wisconsin.	Missouri.	New Jersey	Kentucky.*
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Length, 887½ ft. ; Beam 108 ; Displacement, 45,000 tons ; Completed, 1943-44.

Armament, 9—16-in., 20—5-in. ; many 40-m.m. and 20 mm. ; 4 Aircraft.

N.B.—The above diagrams are slightly below the true scale.

* Not completed. Will have an armament of rockets in place of guns.

UNITED STATES.

BATTLESHIPS.

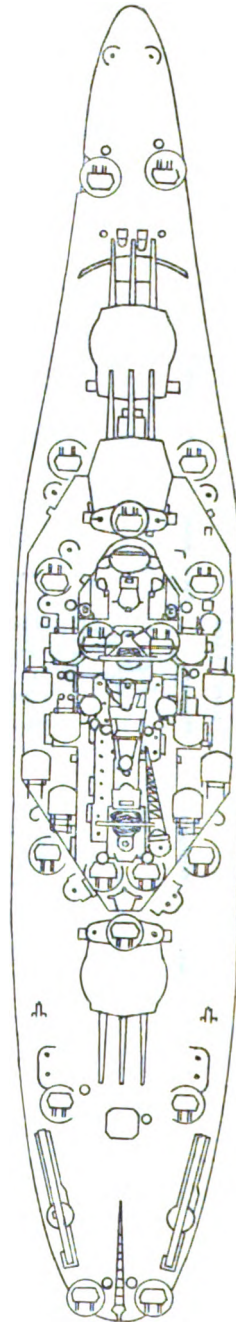
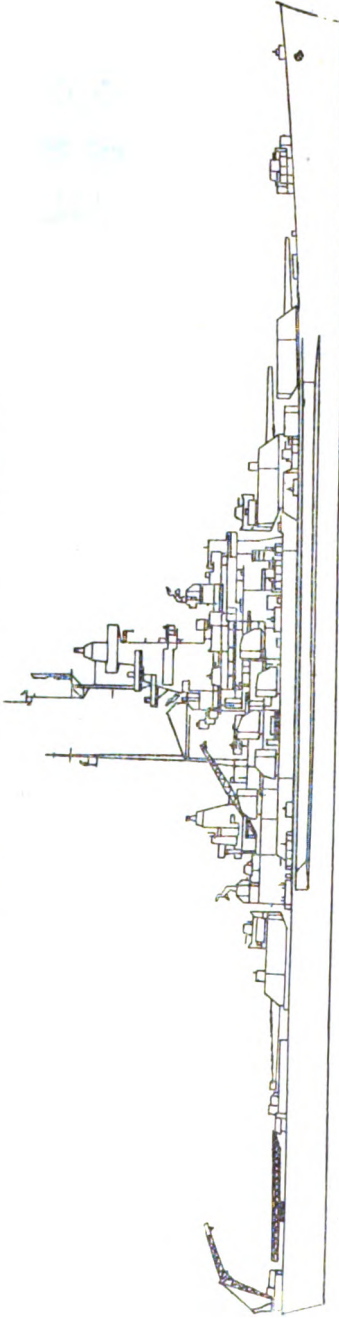
" *South Dakota* " Class.

South Dakota.

Indiana.

Alabama.

Massachusetts.



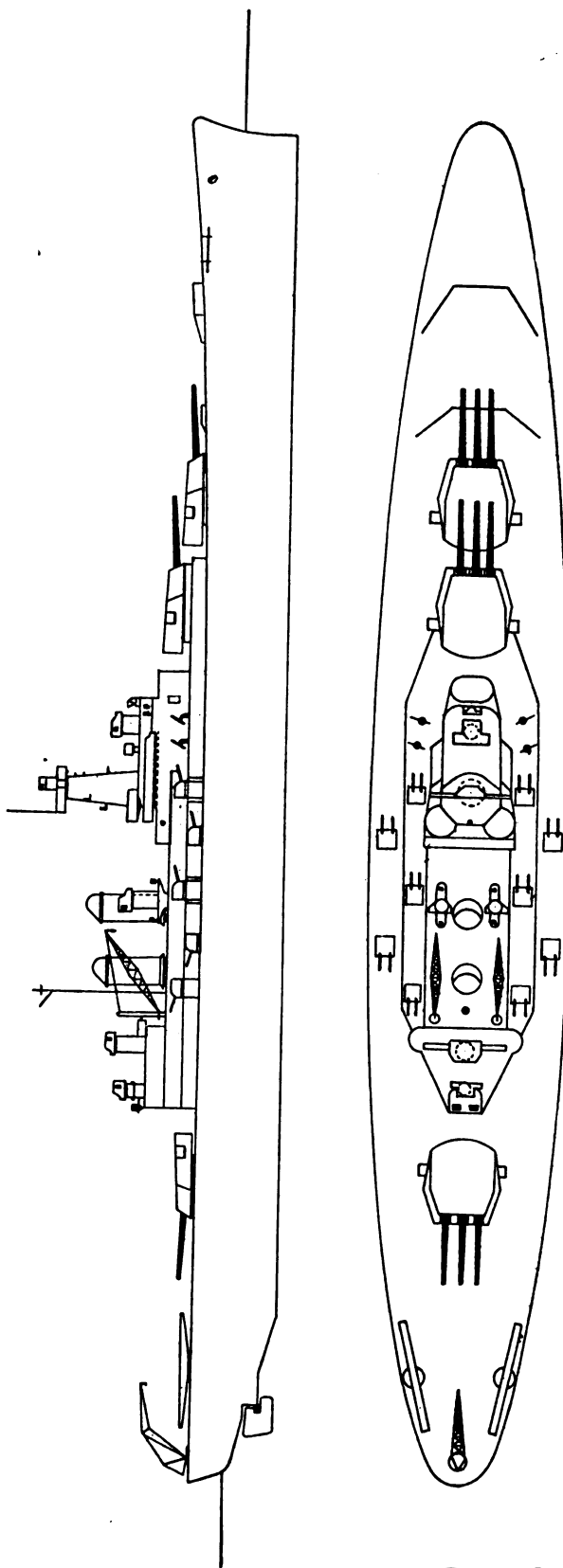
Length, 680 ft. ; displacement, 35,000 tons ; 27 knots.
Armament, 9—16-in. guns ; 20—5-in. (16—5-in. in *South Dakota*) ; 3 aircraft.

UNITED STATES.

BATTLESHIPS.

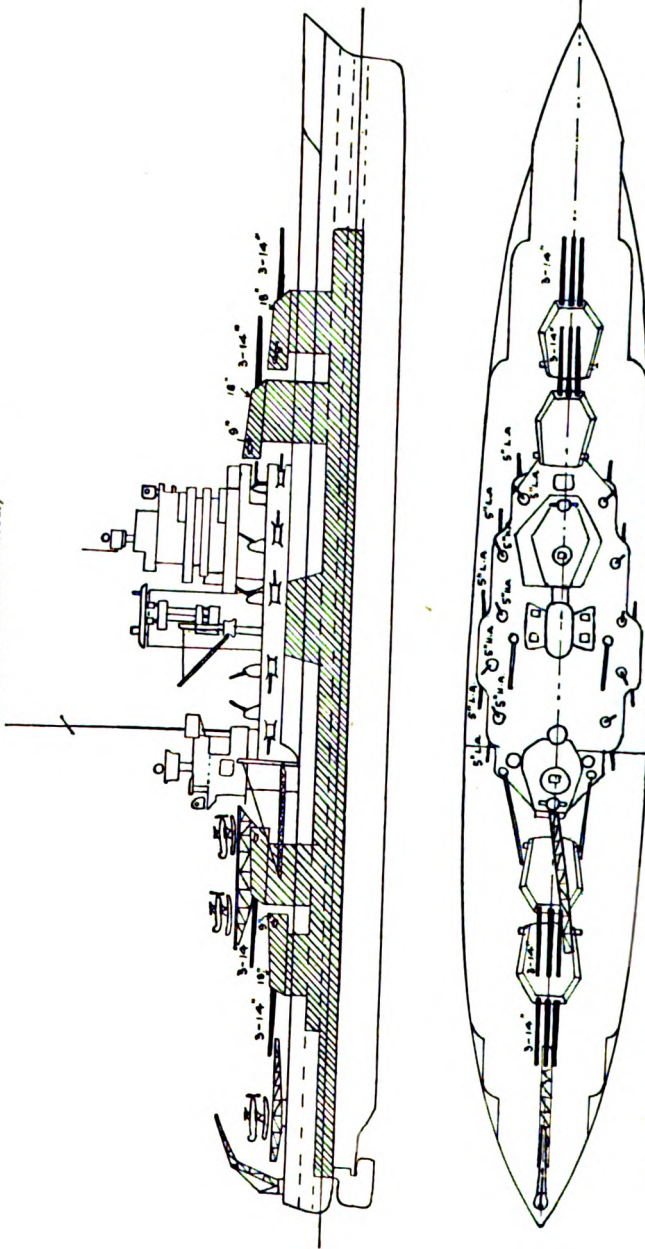
"North Carolina" Class.

Washington. North Carolina



Length, 729 ft.; 85,000 tons; speed, 27 knots. Completed 1941.
 Armament, 9—16-in. 20—5-in.; many smaller A.A.; 3 aircraft; 2 catapults

UNITED STATES.
BATTLESHIPS.
New Mexico.
Mississippi.
Idaho.
(After modernisation 1934.)



Length (extreme), 624 ft. ; Length, W.L., 600 ft. ; Speed, 21 knots ; 33,400 tons ; Idaho and New Mexico, 33,400 tons ; Completed, 1917-19.
Modernised, 1931-34. Armament, 12-14-in. ; 6-5-in. ; 8-5-in. A.A. ; many small A.A. guns ; 2 catapults ; 8 seaplanes.

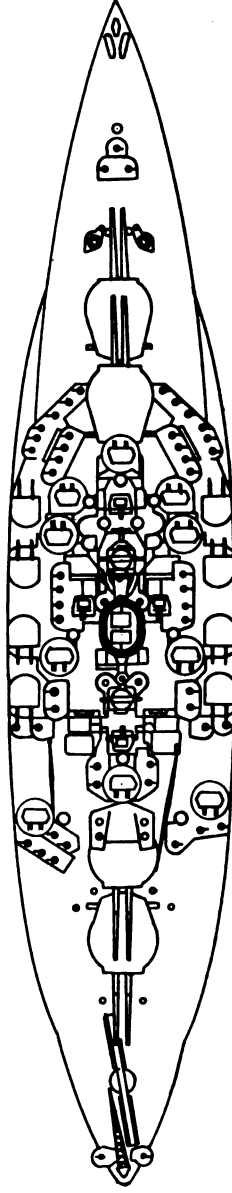
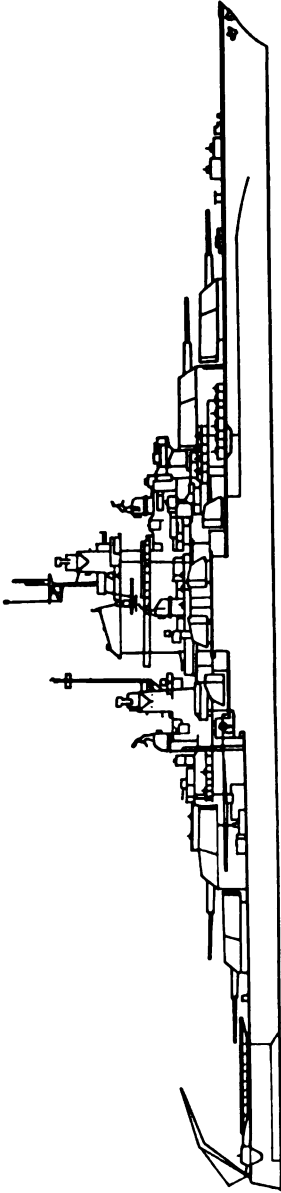
UNITED STATES.

BATTLESHIPS.

Colorado.

Maryland.

West Virginia.

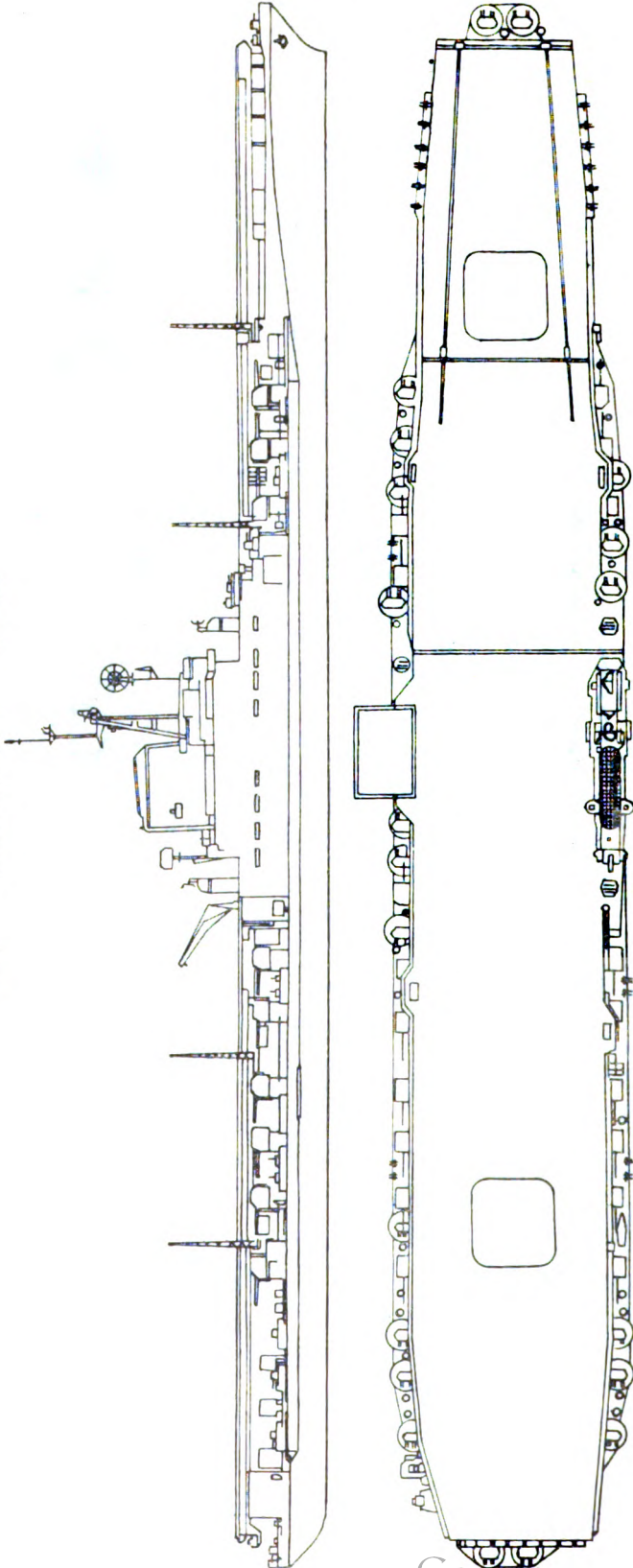


Length (extreme), 624 ft. ; Length W.L., 600 ft. ; Speed, 21 knots ; 21,500—32,500 tons ; Maryland, completed, 1921 ; Colorado and West Virginia, completed, 1922.

Armament, 8—16-in. ; 12—5-in. A.A. ; many small A.A. guns ; 2 submerged 21-in. torpedo tubes ; 2 catapults ; 3 aircraft.

UNITED STATES.
AIRCRAFT CARRIERS,
"Midway" Class.

Midway. Franklin D. Roosevelt. Coral Sea.



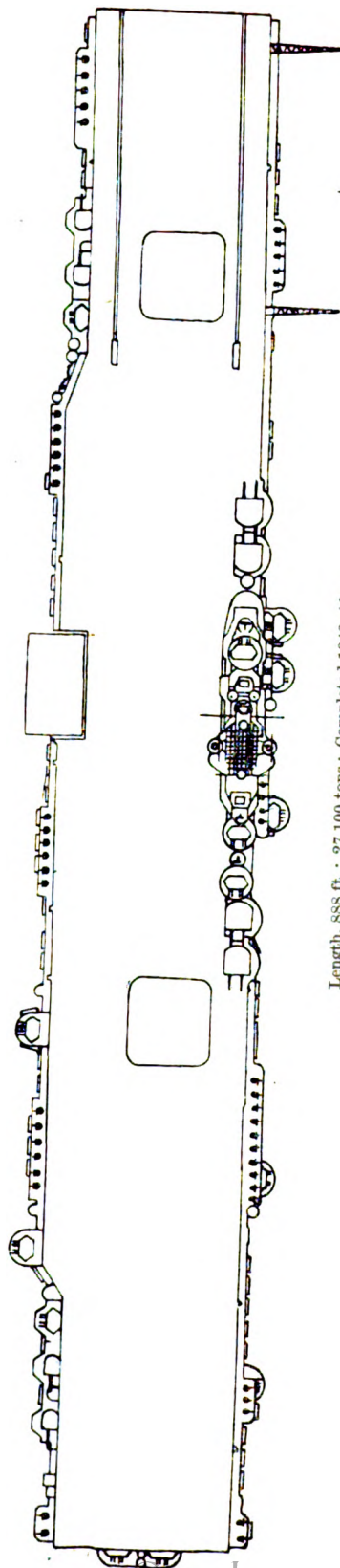
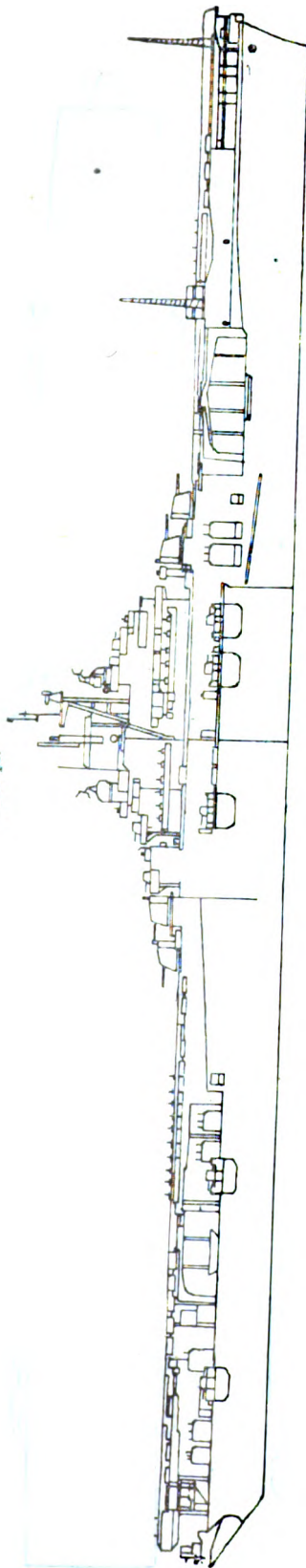
Length, 986 ft. ; 45,000 tons ; Completed 1946.

Armament, 18—5-in. (single mounts) ; many smaller.

N.B.—The above diagrams are slightly below the true scale.

UNITED STATES
AIRCRAFT CARRIERS,
"Essex" Class.

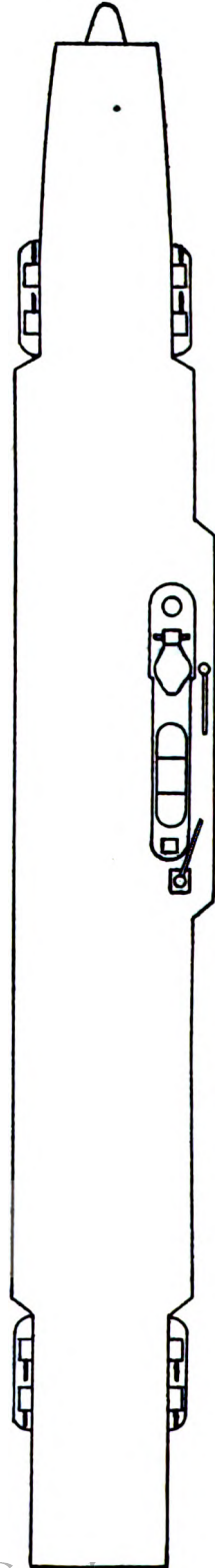
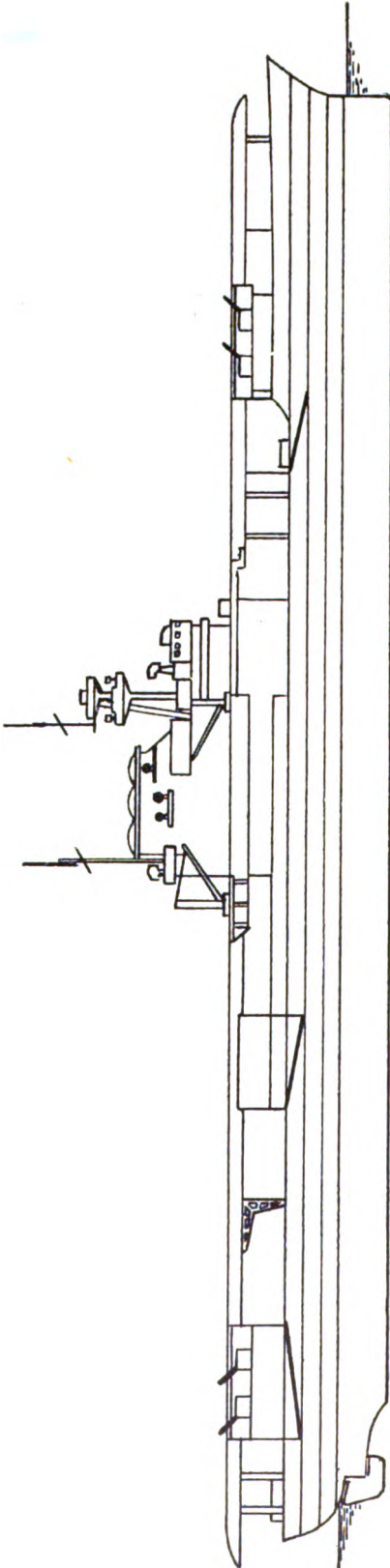
24 ships.



Length, 888 ft. ; 27,100 tons ; Completed 1943-46.
Armament, 12-5-in. ; many 40-m.m. ; about 80 aircraft.
N.B.—The above diagrams are slightly below the true scale.

UNITED STATES.
AIRCRAFT CARRIER.

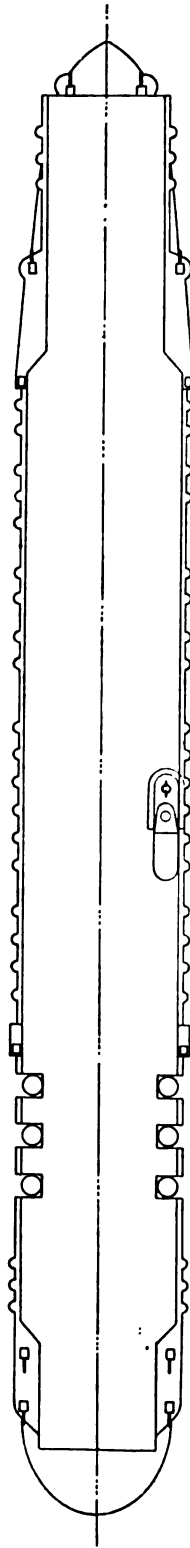
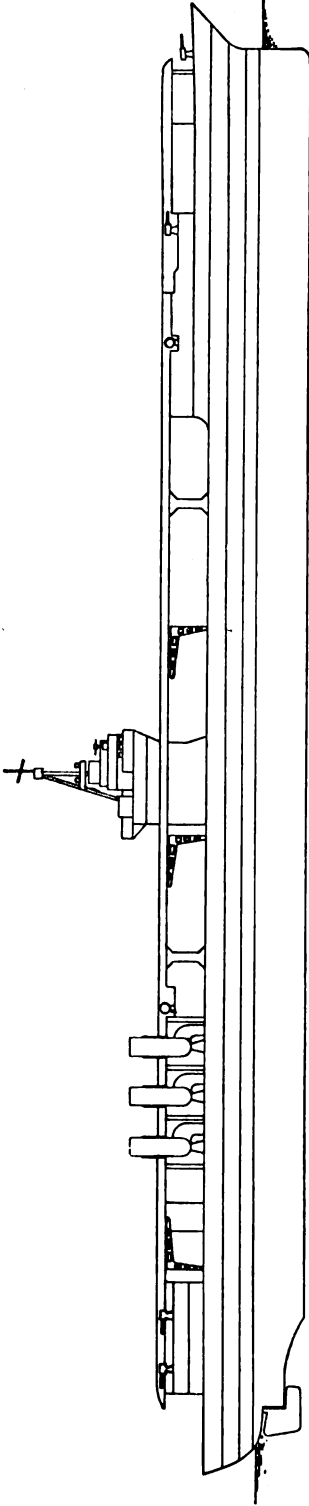
Enterprise.



Length (extreme), 804 ft.; 19,900 tons; Speed, 34 knots; completed 1938.
Armament, 8—5-in. A.A.; many small A.A.; 80 aircraft; 1 catapult.

UNITED STATES.
AIRCRAFT CARRIER.

Ranger.

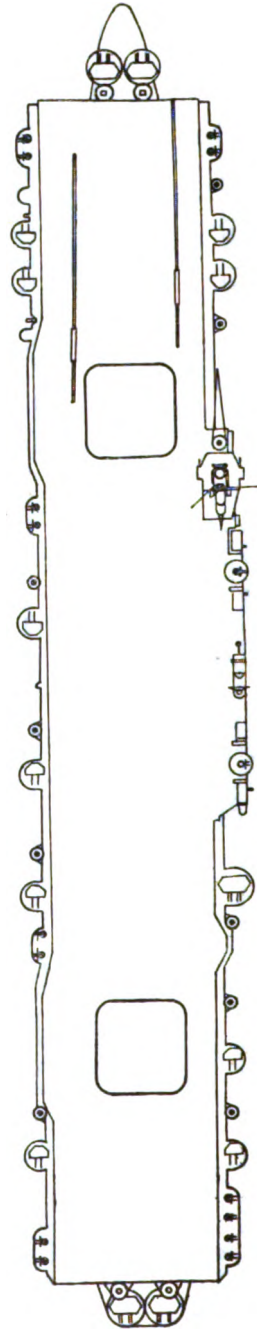
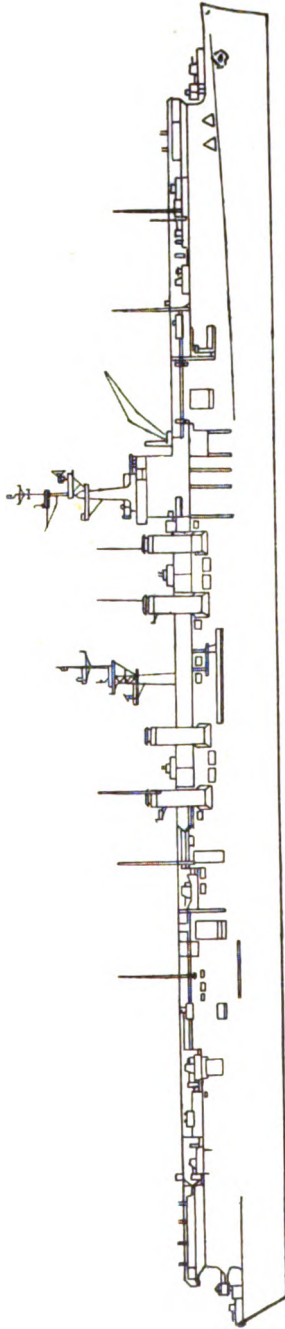


Length (overall), 769 ft.; Length W.L., 723 ft.; Displacement, 14,500 ton.; Speed, 29½ knots. Completed, 1934.

Armament, 8—5-in. A.A.; many small A.A.; 76 aircraft.

NOTE.—The funnels can be swung outboard. Signal masts fitted at ends of flight deck.

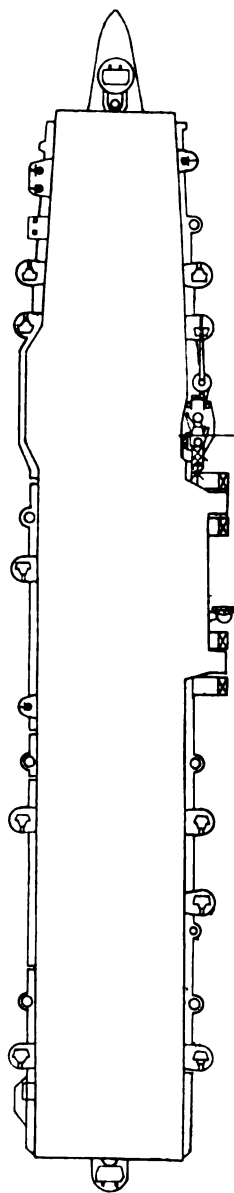
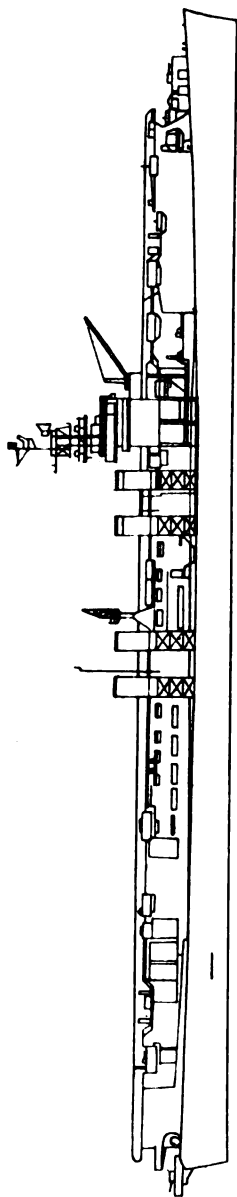
UNITED STATES.
AIRCRAFT CARRIERS.
"Saipan" Class.
Saipan. Wright.



Length, 683 ft. ; displacement, 14,500 tons ; Completed 1945-46.
Armament, many light A.A. guns.

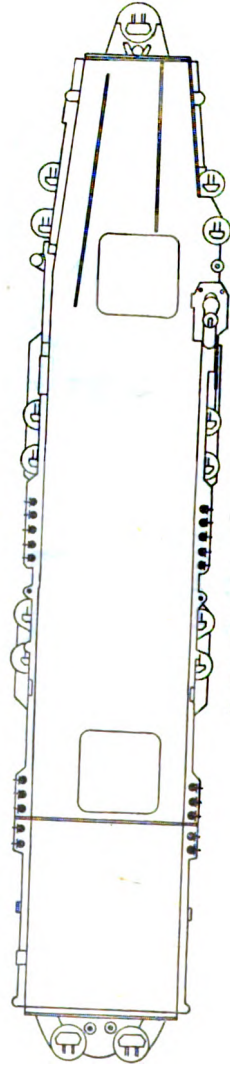
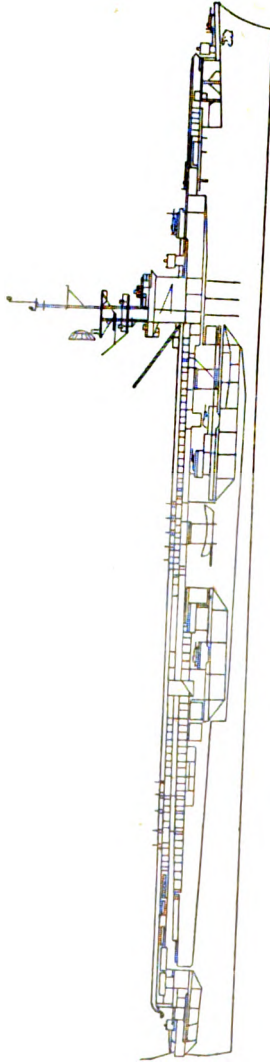
UNITED STATES.
AIRCRAFT CARRIERS.
"Independence" Class.

8 ships.



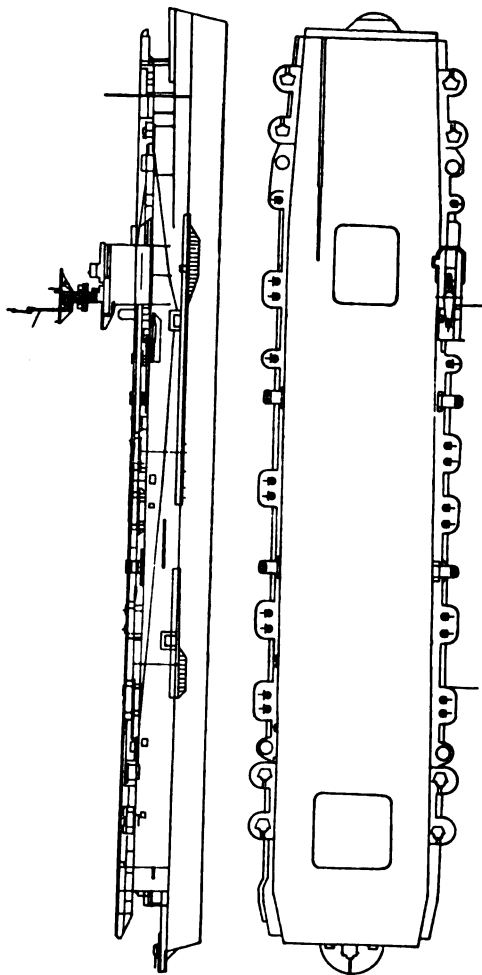
Length, 610 ft. ; Displacement, 11,000 tons ; Completed 1943.
Armament, many light A.A. guns ; 40 m.m. and 20 m.m.

UNITED STATES.
AIRCRAFT CARRIERS.
"Commencement Bay" Class.
19 ships.



Length, 553 ft. ; displacement, 12,000 tons.
Armament, 2—5-in. ; many smaller.

UNITED STATES.
AIRCRAFT CARRIERS.
"Casablanca" Class.
45 ships.



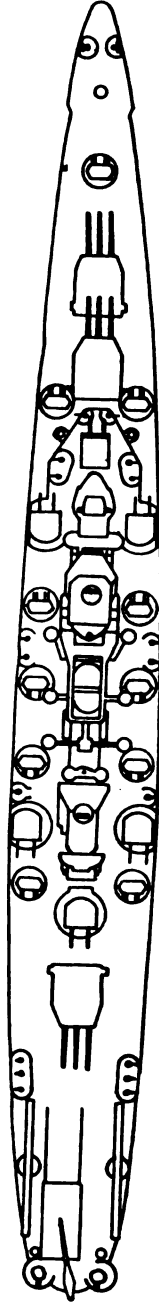
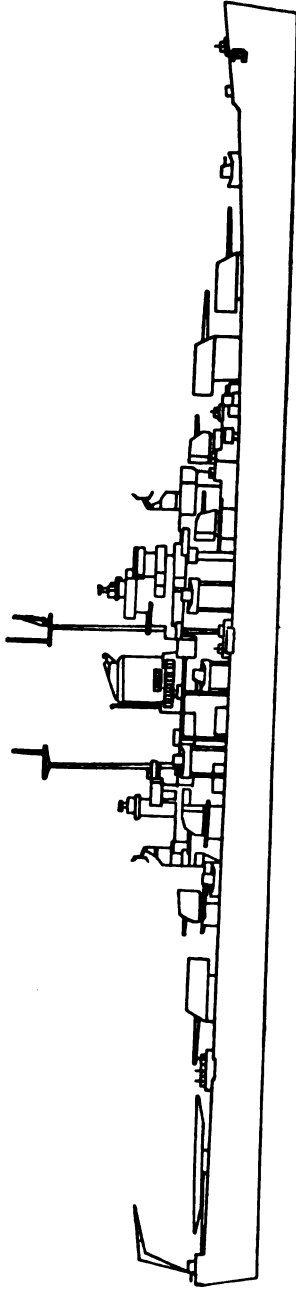
Length, 488 ft. 9 in. Displacement 6,730 tons.
Armament, 1-6-in. ; many smaller.

UNITED STATES.

CRUISERS.

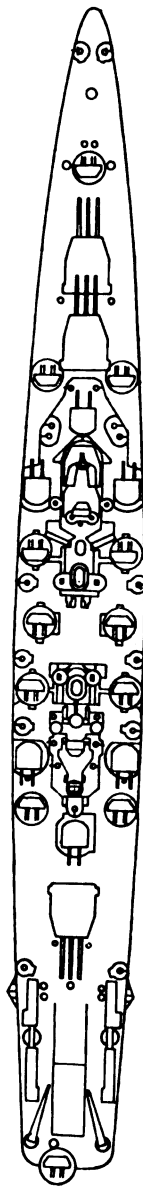
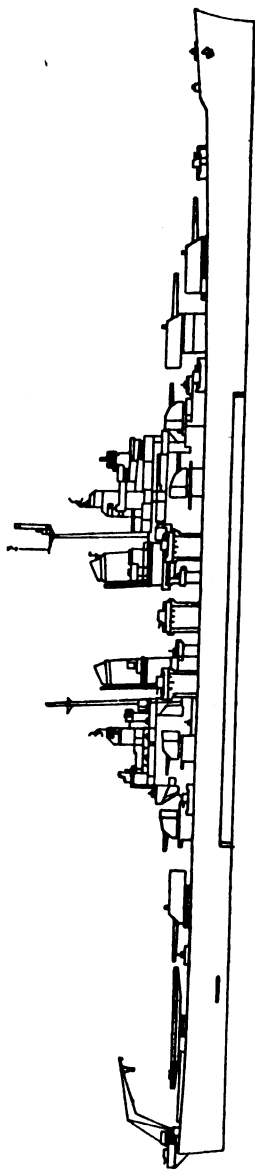
"Oregon City" Class.

3 ships.



Length, 673½ ft. ; Displacement, 13,600 tons ; 30 knots.
Armament, 9—8-in., 12—5-in. ; many light A.A. guns.
These vessels are single funnel Baltimores.

UNITED STATES.
CRUISERS.
"Baltimore" Class.
14 vessels.

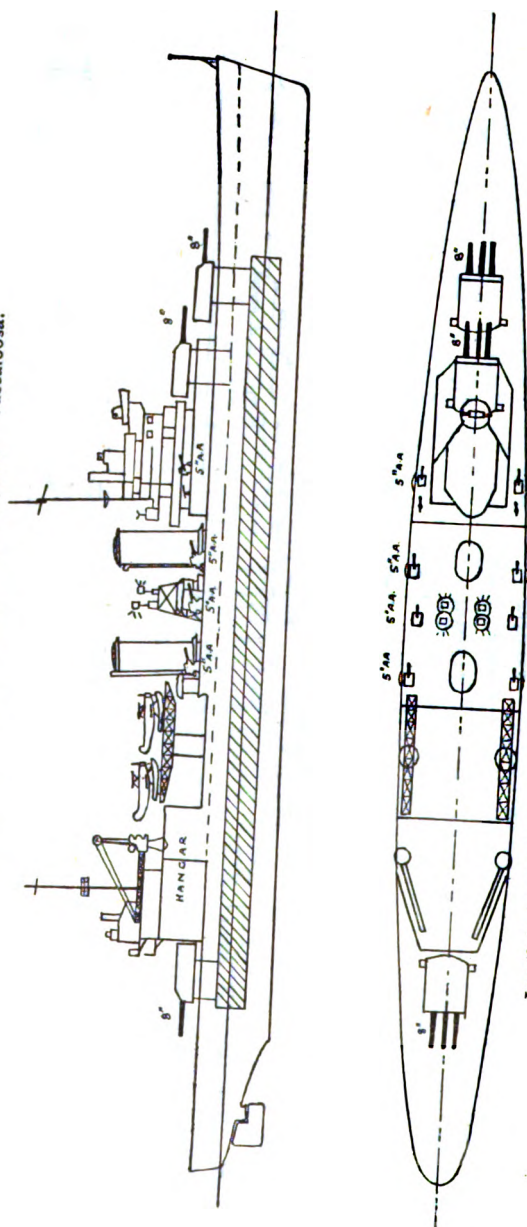


Length, 673½ ft. ; Displacement, 13,600 tons ; 30 knots.
Armament, 9—6-in., 12—5-in. ; many lighter guns.

UNITED STATES.
CRUISERS.

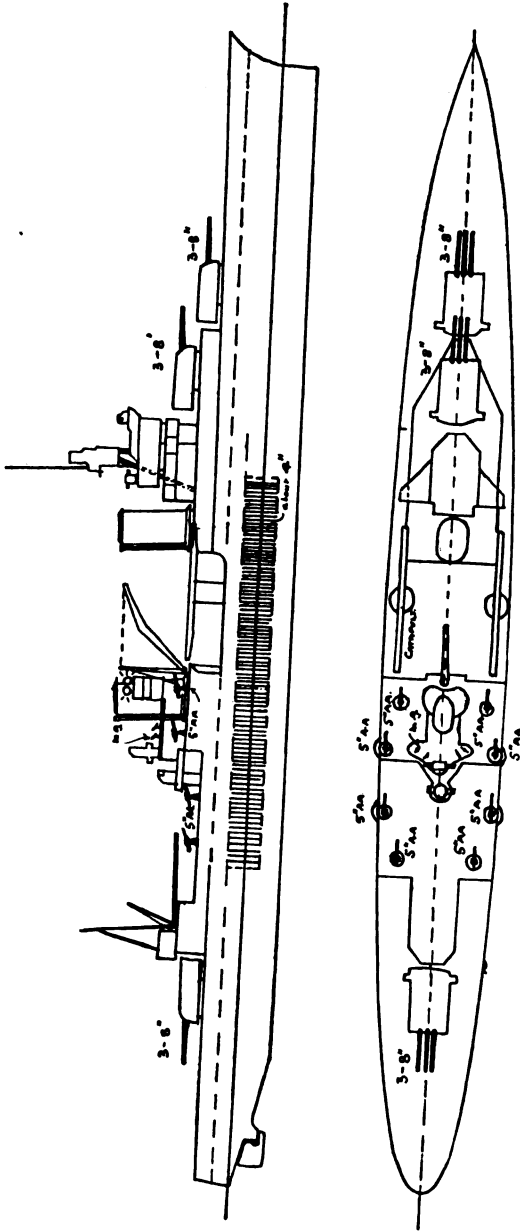
'New Orleans' Class.

New Orleans. San Francisco. Minneapolis. Tuscaloosa.



Length (extreme), 588 ft.; on W.L., 574 ft.; 9,650 tons; Speed, 32.7 knots; Completed, 1934-36.
Armament, 9—8-in., 8—6-in.; many small A.A. guns; 2 catapults; 4 aircraft.

UNITED STATES.
CRUISER.
Portland.

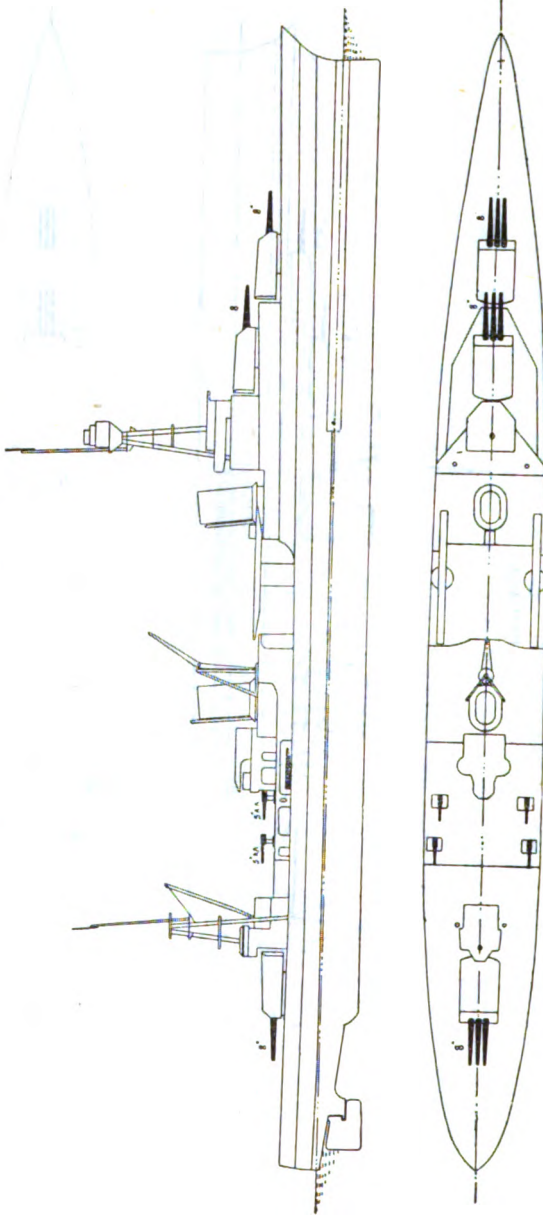


Length (extreme), 610 ft. 3 ins.; 9,800 tons; Speed, 32.7 knots. Completed, 1933.
Armament, 9—8-in., 8—5-in. A.A.; many small A.A. guns; 2 catapults; 4—6 aircraft.
Corrections to plan.—Mainmast moved to fore side of after funnel.

UNITED STATES.

CRUISERS.

Chester. Augusta. Louisville. ("Chester" Class.)



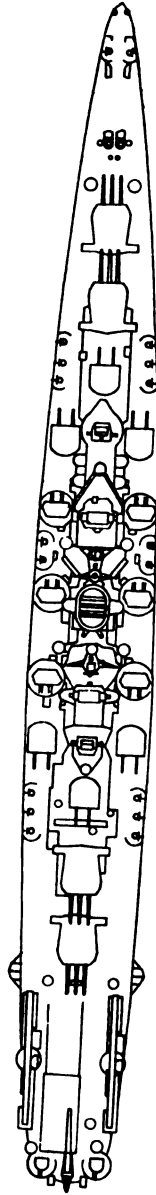
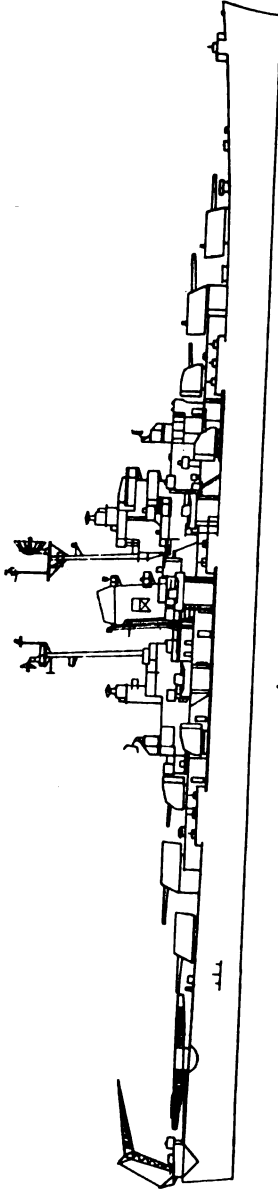
Length (extreme), 600½ ft. ; 9,050-9,300 tons ; Speed, 32.5 knots ; Completed, 1930-31.
 Armament, 9-8-in. ; 8-6-in. A.A. ; many small A.A. guns ; 2 catapults ; 4-6 seaplanes.

UNITED STATES.

CRUISERS.

"*Fargo*" Class.

3 ships.



Length, 608 ft. ; Displacement, 10,000 tons ; Completed 1945-46.
Armament, 12—6-in. ; 12—5-in. ; many smaller A.A. ; 4 aircraft.

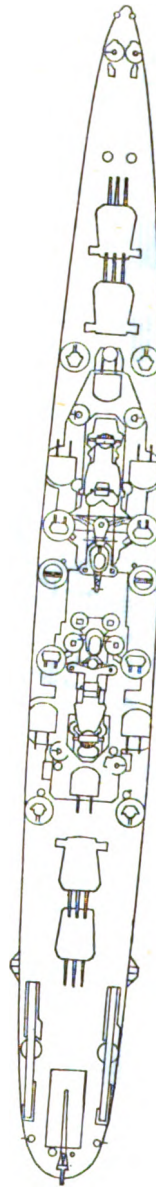
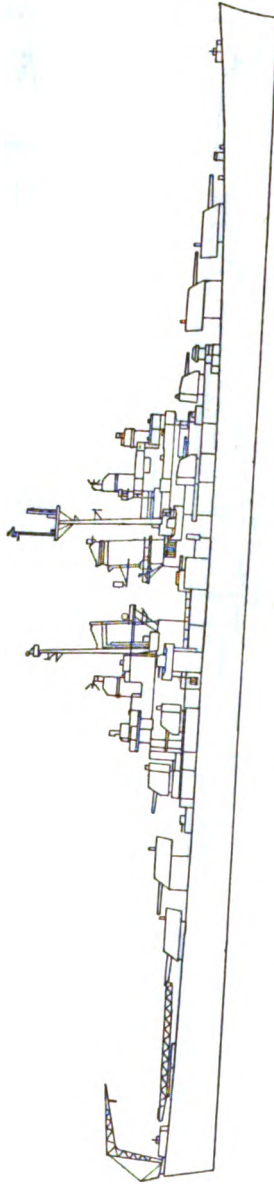
These vessels are single funnel Clevelands.

UNITED STATES.

CRUISERS.

"Cleveland" Class

26 ships.



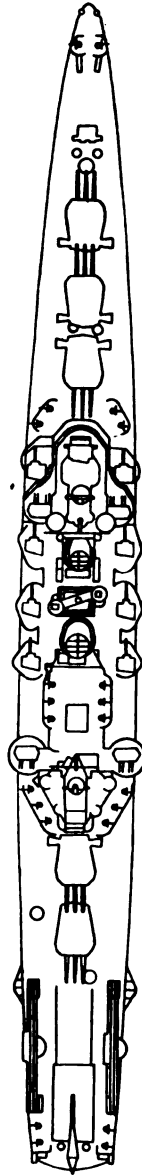
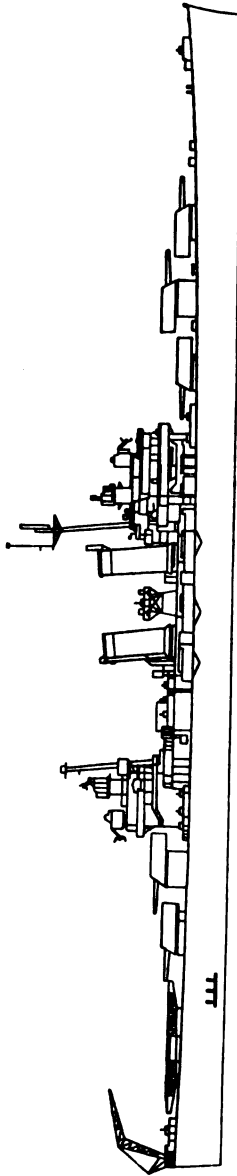
Length, 608 ft. ; Displacement, 10,000 tons ; Completed 1942-46.
Armament, 12—6-in., 12—5-in. ; many smaller ; 4 aircraft.

UNITED STATES.

CRUISERS.

" *Brooklyn* " Class.

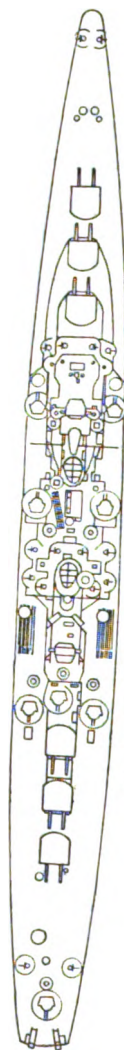
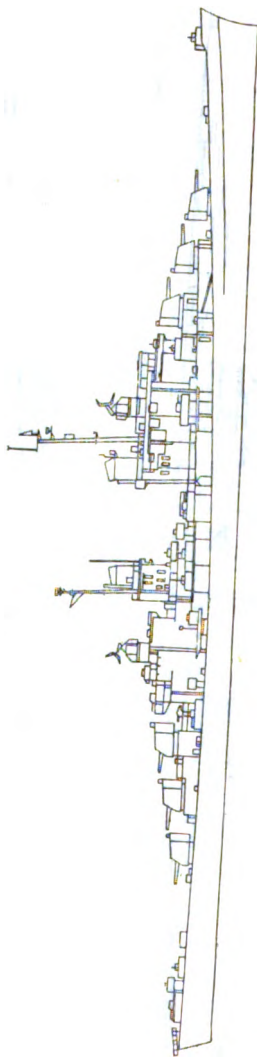
8 ships.



Length, 608 ft. ; Displacement, 9,700 tons ; Completed 1938.
Armament ,15—6 in. ,8—5-in. ; many smaller ; 4 aircraft.

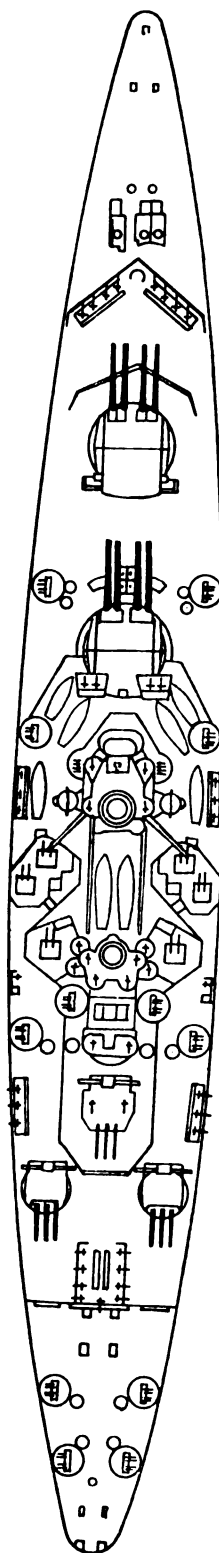
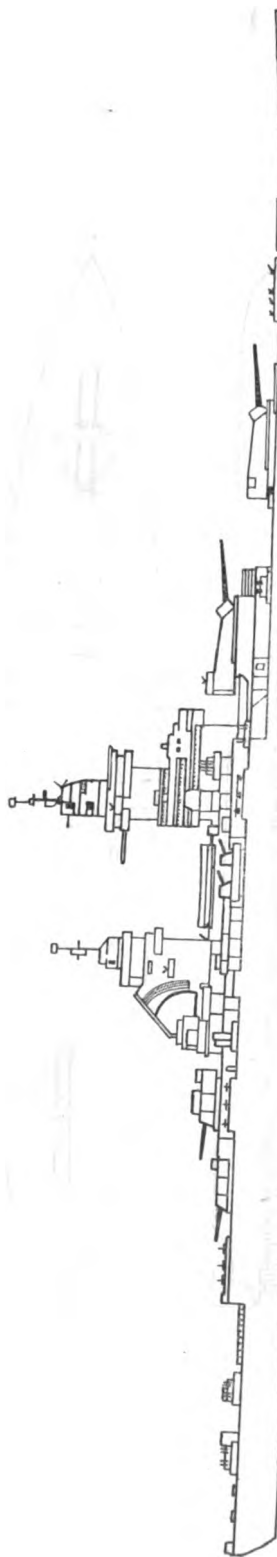
UNITED STATES.
CRUISERS.

"San Diego" and "Oakland" Classes.
9 ships.



Length, 541 ft. ; Displacement, 6,000 tons ; Completed 1942-46.
Armament, 12 or 16—5-in. ; many smaller.

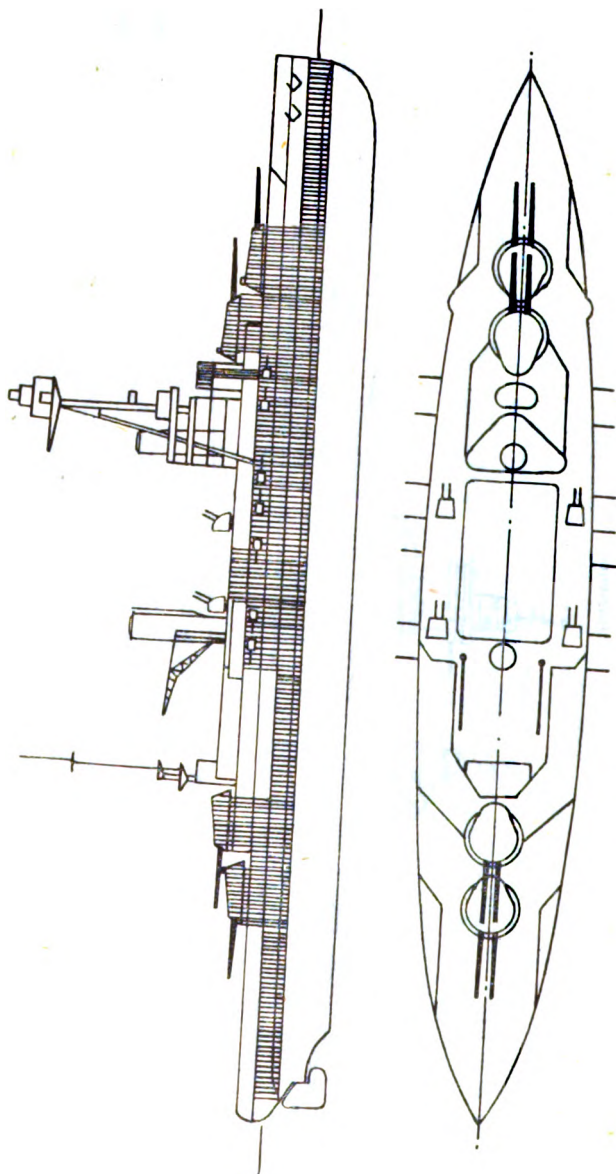
**FRANCE.
BATTLESHIP
Richelieu.**



(P63)

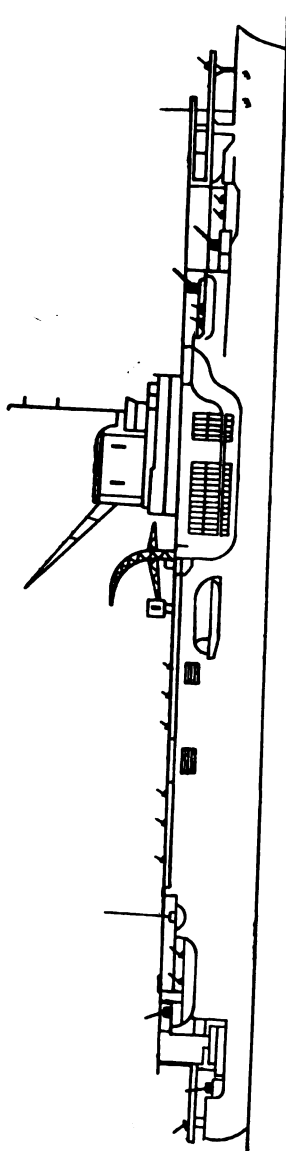
Length, 794 ft. ; 35,000 tons ; Speed, 31 knots, approx.
Armament, 8—15-in. ; 9—6-in. ; 12—3-in. A.A. ; 67—40-m.m. A.A. ; 80—20-mm. A.A.

FRANCE.
BATTLESHIP.
Lorraine.



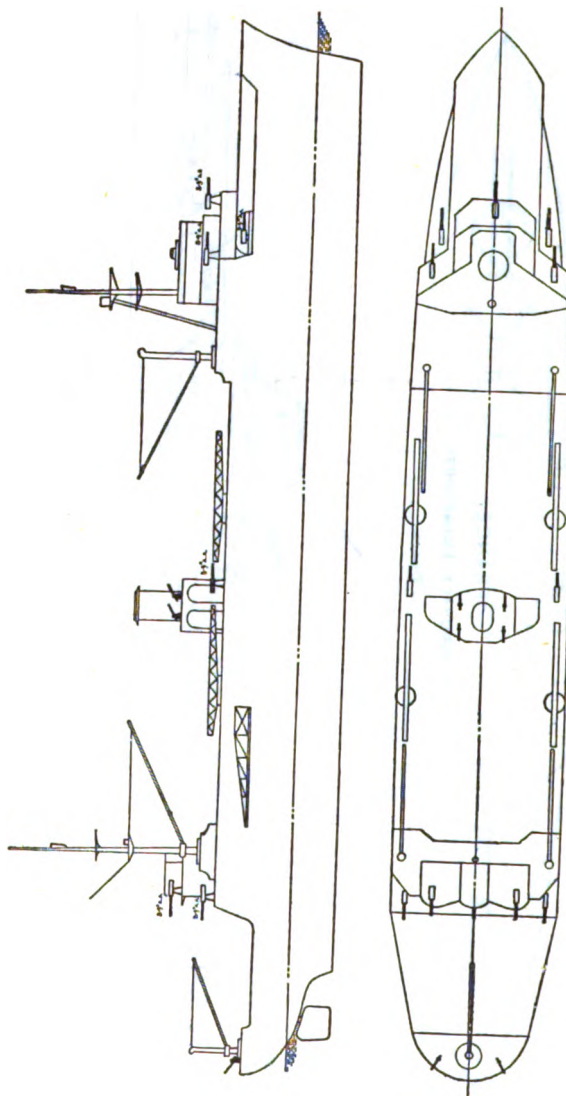
Length (extreme), 544 ft. 6 ins. ; 22,180 tons ; Speed, 21 knots.
Armament, 10—13.4-in. ; 14—6.4-in. ; 8—3-in. A.A. Many smaller.

FRANCE.
AIRCRAFT TRANSPORT.
Béarn.



Length, 598 ft. ; 22,146 tons ; Speed, 21½ knots.
Armament, 4—5-in. A.A. ; 28—20-mm. A.A.

FRANCE..
AVIATION TRANSPORT.
Commandant Teste.

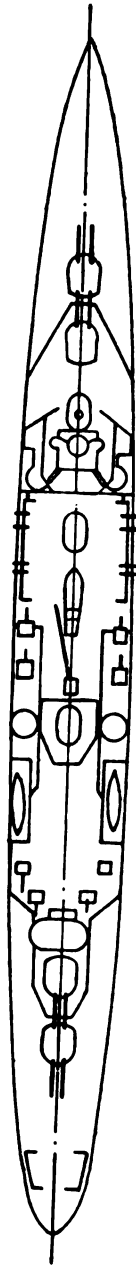
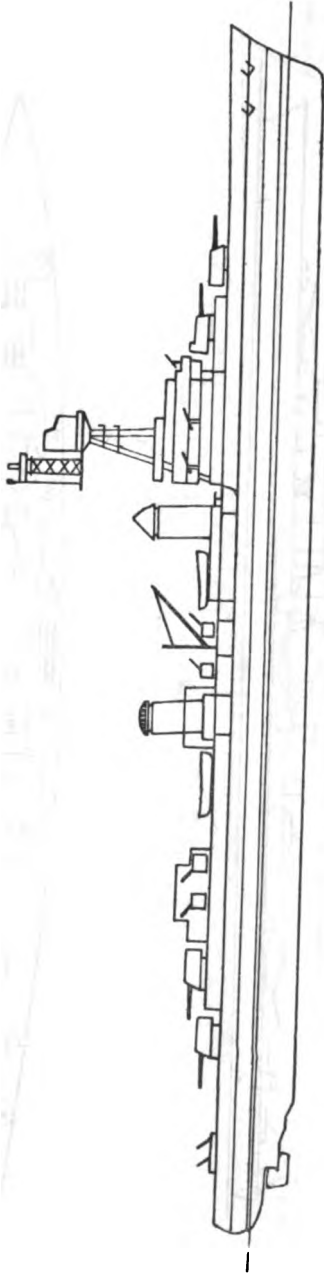


Length (extreme), 548 ft. ; 10,000 tons Speed, 20½ knots; Completed, 1932.
Armament, 12—3·9-in. A.A. ; 8—3-pr. A.A. ; 12 M. ; 19 planes.

FRANCE.

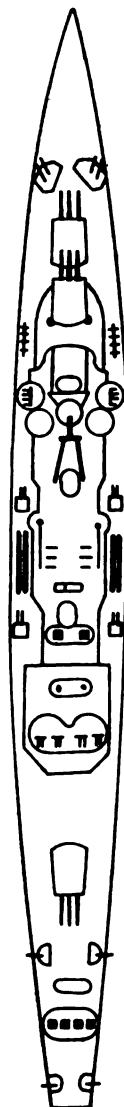
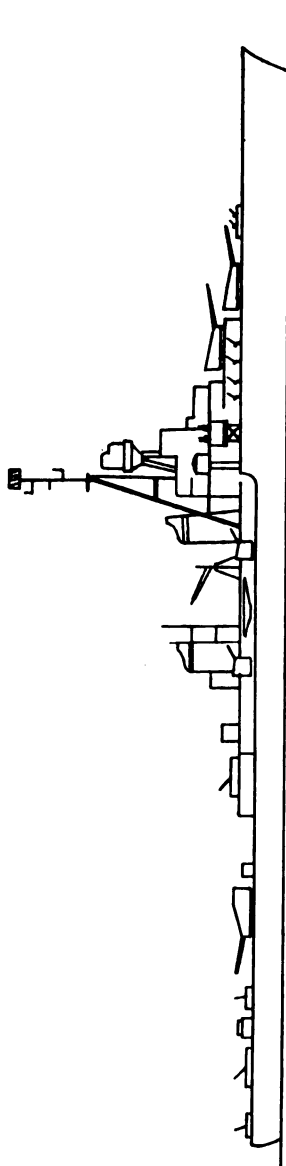
CRUISERS.

Duquesne. Tourville. ("Duquesne" Class.) Suffren.



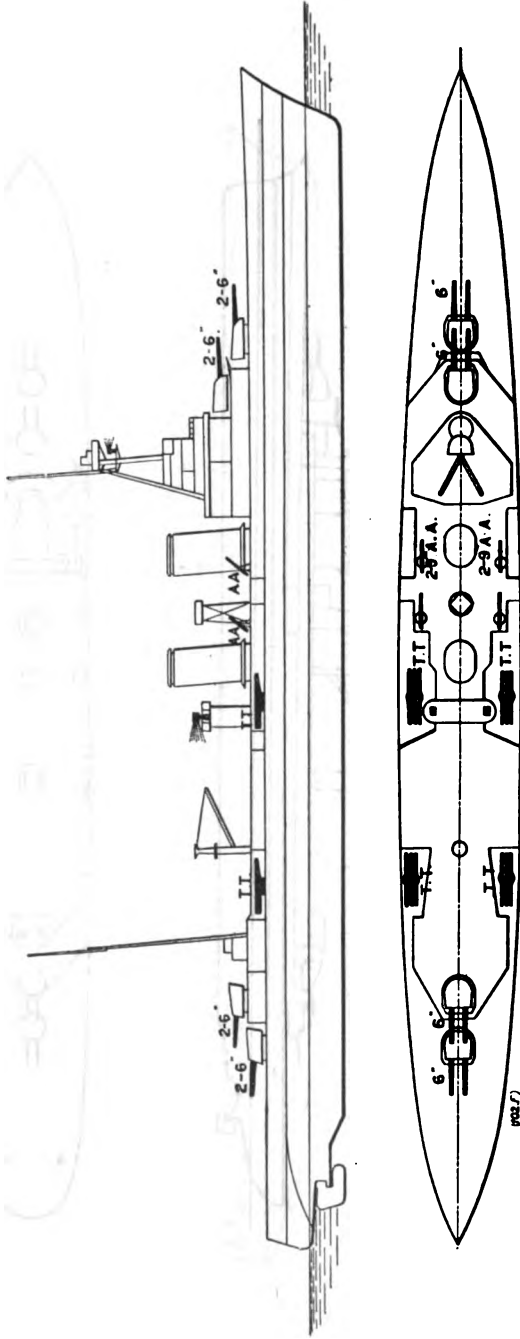
Length, 643 ft; 10,000 tons; Speed, 32 knots (Duquesne and Tourville, 33½ knots).
Armament, 8—8-in., 8—3-in. A.A., 8—1.6-in. A.A.

FRANCE.
CRUISERS.
Gloire. Montcalm. Georges Leygues.



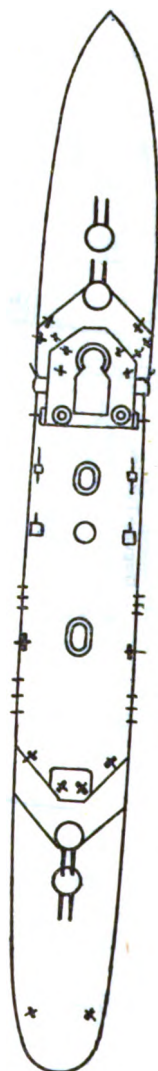
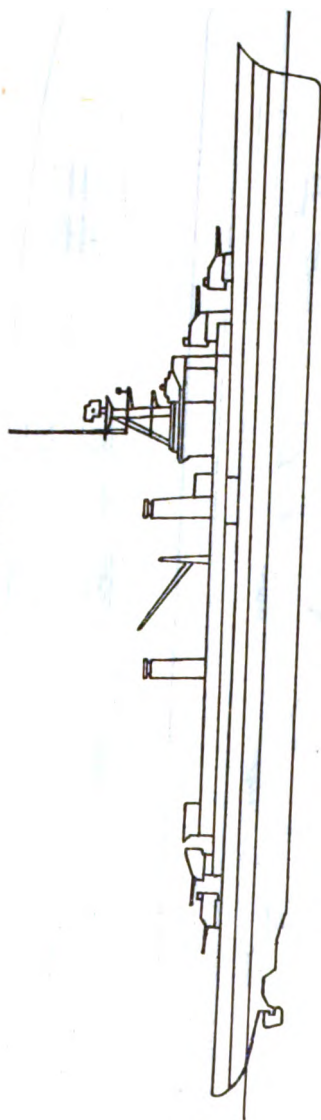
Length (extreme), 530 ft. ; 7,600 tons ; Completed, 1935-37 ; Speed, 31 knots.
Armament, 9-6-in. ; 8-5.5-in. A.A. ; 24-40-mm. A.A. ; 16-30-mm. A.A.

**FRANCE.
CRUISER.
Duguay-Trouin.**



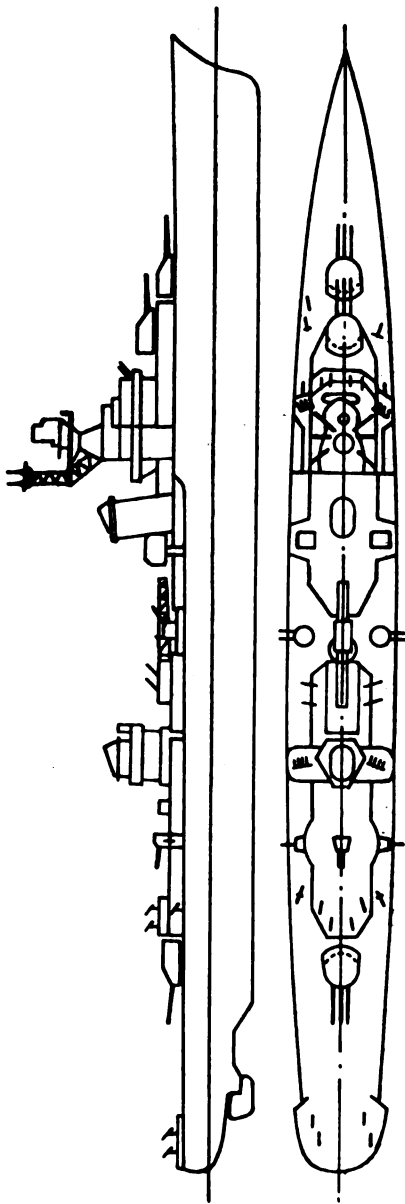
Length (extreme), 594 ft. 10 ins. ; Length B.P., 575 ft. ; 7,249 tons ; Speed, 34 knots. Completed, 1928.
Armament, 8—6-1/2 in. ; 4—3-in. A.A. ; 6—40-mm. A.A. ; 22—20-mm. A.A.

FRANCE.
TRAINING CRUISER.
Jeanne d'Arc.



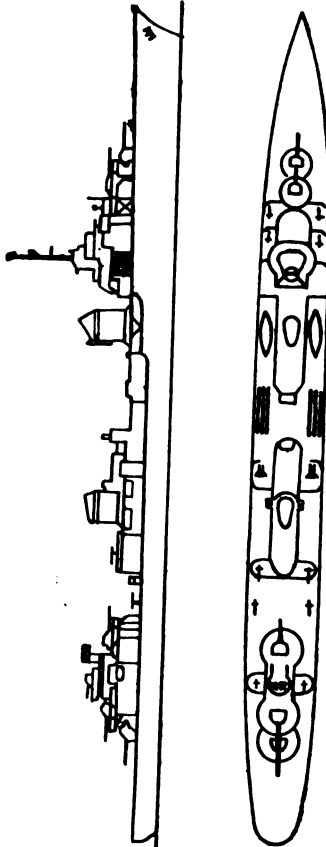
Length, 557 ft. 9 ins. ; 6,496 tons ; Speed, 26 knots.
Armament, 8-6.1-in. ; 4-3-in. A.A. ; 14-40-mm. A.A. ; 20-20-mm. A.A.

FRANCE.
CRUISER MINELAYER.
Emile Bertin.



Length, 580 ft. 9 in.; 5,386 tons; Speed, 34 knots.
Armament, 9-6-in.; 8-8-6-in. A.A. Others smaller.

FRANCE.
LIGHT CRUISERS.
Le Fantasque. Le Malin. Le Terrible. Le Triomphant.



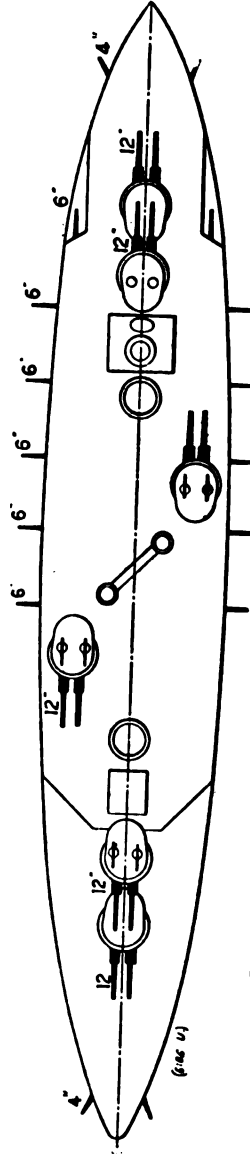
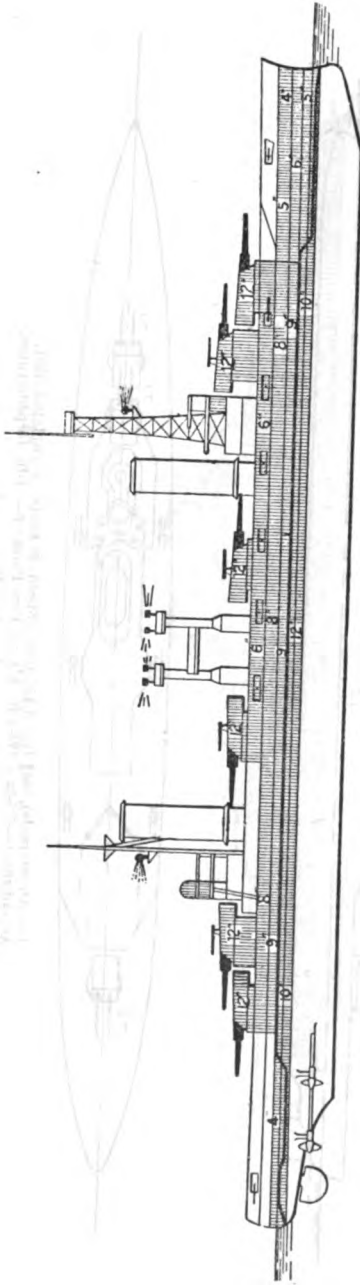
Length, 434 ft. 6 in. ; 2,500 tons; Speed, 37 knots.
Armament, 6-5.4-in. ; 8-40-mm. A.A. ; 10-20-mm. A.A. ; 6-21-in. r.r.

ARGENTINA.

BATTLESHIPS.

Moreno.

Rivadavia.



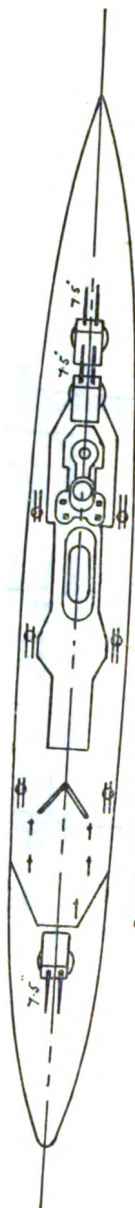
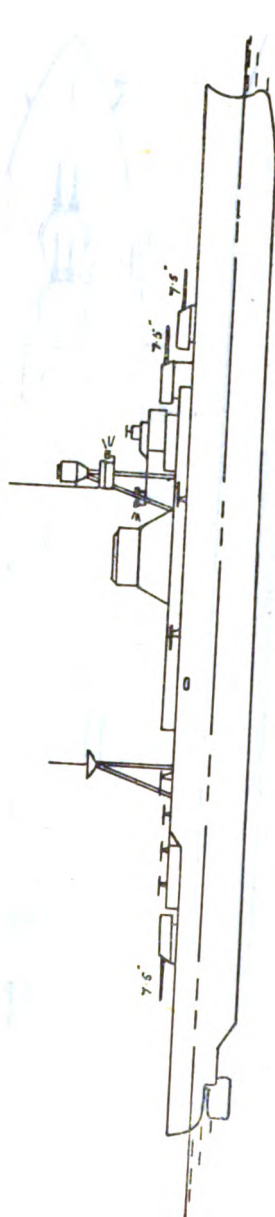
Length (extreme), 585 ft. ; Length on W.L., 575 ft. ; 27,940 tons. Speed, 22½ knots ; Completed, 1914-15.
 Armament, 12—12-in. ; 12—6-in. ; 4—3-in. A.A. ; 4 M. ; 4 L. ; 8 submerged 21-in. torpedo tubes.
 8-pdr. guns on B and X turrets replaced by rangefinders.
 Derricks fitted to midship towers.

ARGENTINA.

CRUISERS.

Almirante Brown.

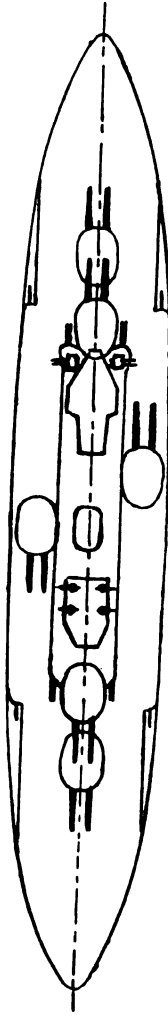
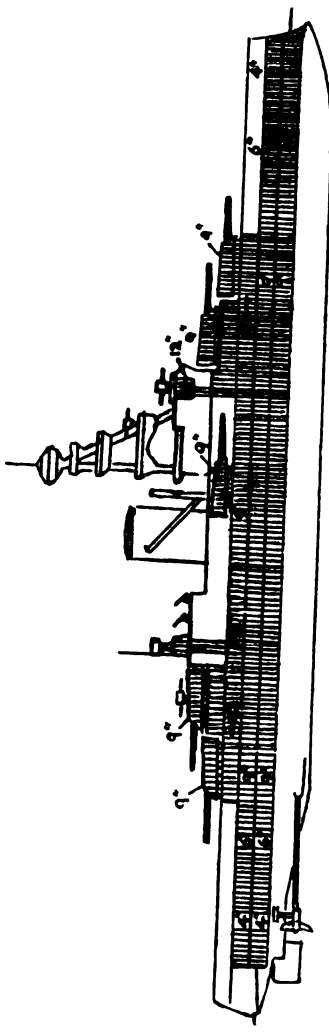
Vinticino de Mayo.



Length (extreme), 545½ ft.; 6,495 tons; Speed, 32 knots. Completed, 1931.
 Armament, 6—7½-in.; 12—4-in. A.A.; 6 Pom Poms; 6—21-in. torpedo tubes,
 1 catapult; 2 seaplanes.
 Corrections to plan.—Derrick fitted on fore side of mainmast. Superstructure built aft side of mainmast.

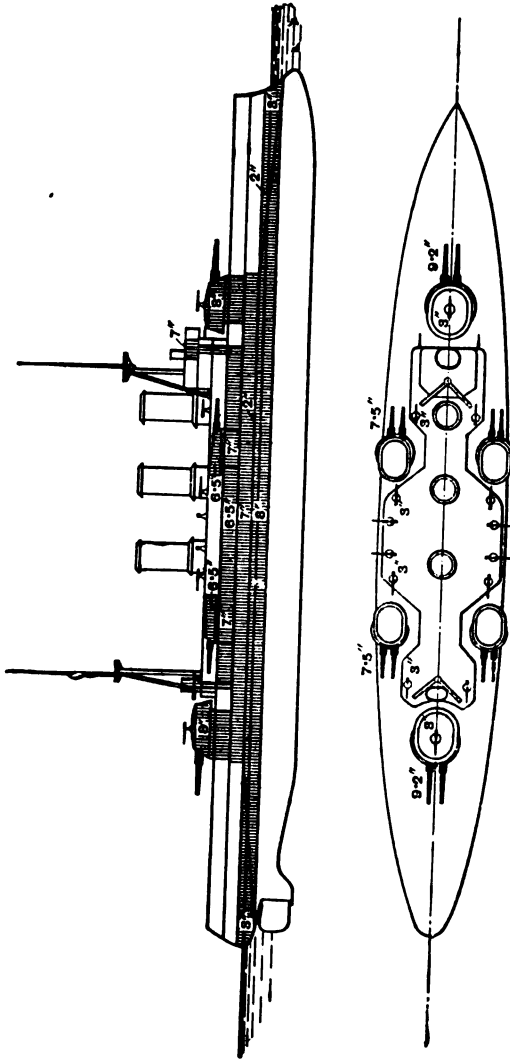
BRAZIL
BATTLESHIPS.

Minas Geraes.
São Paulo.



Length (extreme), 541 ft. ; Length R.P., 500 ft. ; 19,200 tons ; Speed, 21 knots ; Completed, 1909, 1910.
Armament, 14—12-in. ; 14—6-7-in. ; 2—3-pr. ; 4—3-in. A.A. ; 8 M. A.A.

GREECE.
ARMoured CRUISER.
Giorgios Averoff.



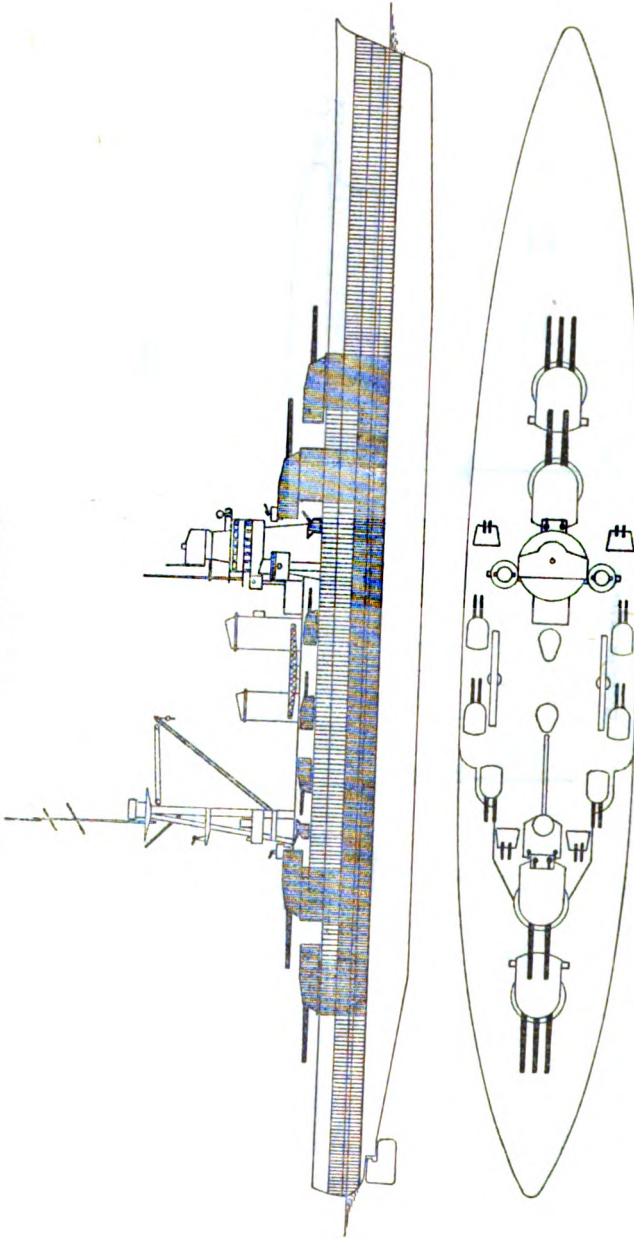
Length, 462 ft.; 9,801 tons; Speed, 22.5 knots; Completed, 1911. Reddited, 1927.
Armament, 4—9.2-in.; 8—7.5-in.; 16—3-in. A.A.; 4—3-pr.; 2 M.; 8 submerged 18-in. torpedo tubes.
Correction to plan.—Bridgework modified. Control top fitted on foremast. Searchlight and derrick fitted to mainmast.

ITALY.

BATTLESHIPS.

Giulio Cesare.
Andrea Doria.
(After modernisation.)

Caio Duilio.



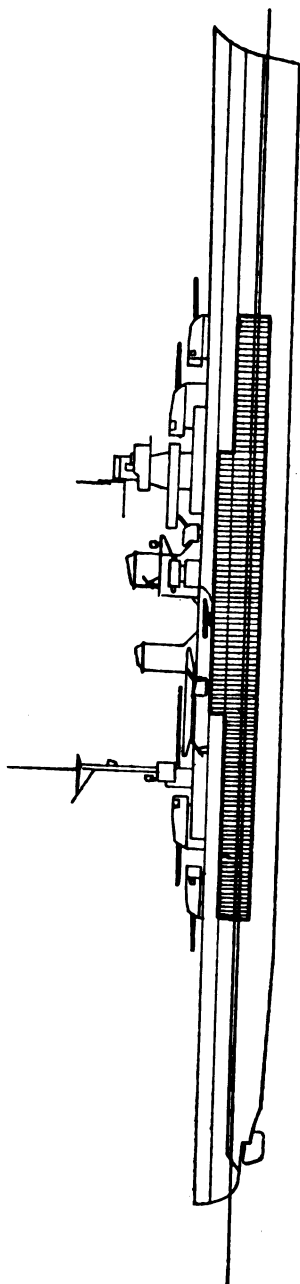
Length (extreme), 611 ft. 6 ins.; 23,622 tons; 27 knots; Completed, 1914-15; Modernised, 1937.
 Armament { 10-12-in.; 12-4-7-in.; 8-3-9-in. A.A.; 38 A.A. M.G.; 4 aircraft; 2 catapults in Cesare.
 Doria and Duilio have a modified bridge structure and a different arrangement of A.A. guns.

ITALY.

CRUISERS.

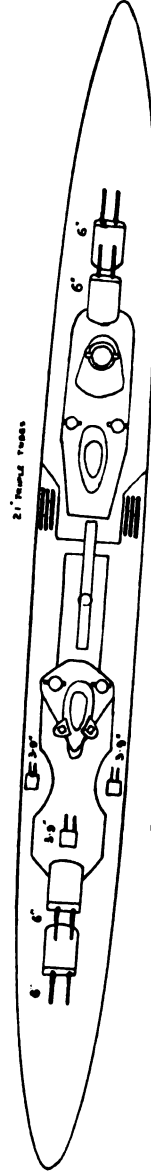
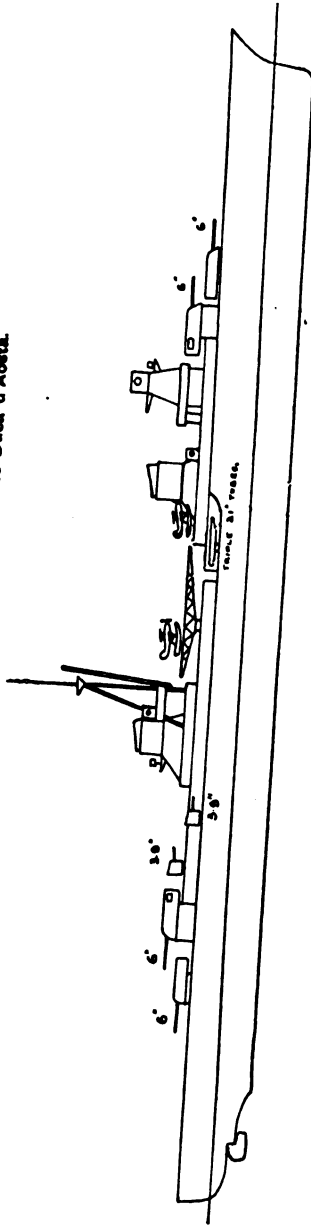
Luigi di Savoia.

Giuseppe Garibaldi.



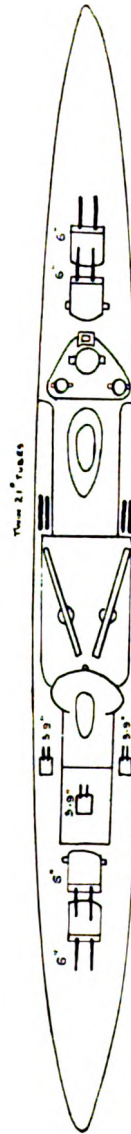
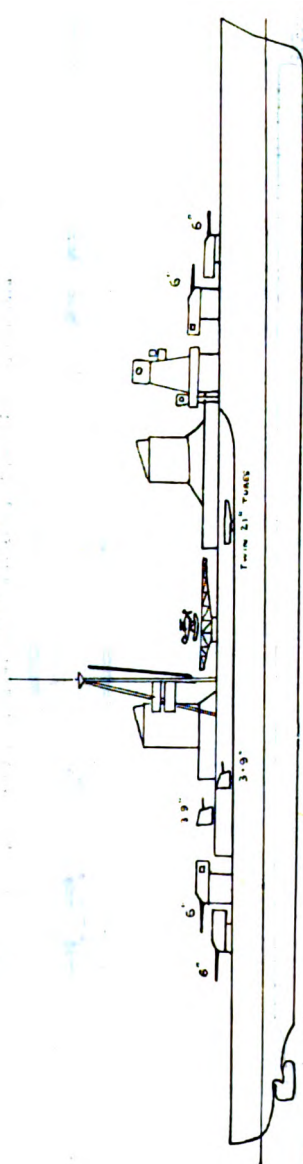
Length (extreme), 613 ft. 9 in.; Standard displacement, 7874 tons; Speed, 35 knots; Completed, 1936. Armament, 10—6 in.; 8—3.9 in. A.A.; 8—1.5 in. A.A.; 6—21 in. torpedo tubes; 2 catapults; 4 aircraft.

ITALY.
CRUISERS,
"Attentato" Class.
Eugenio di Savoia.
Filiberto Duca d'Aosta.



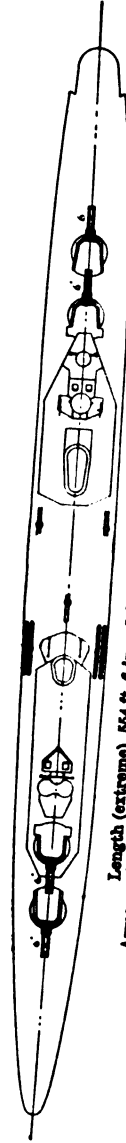
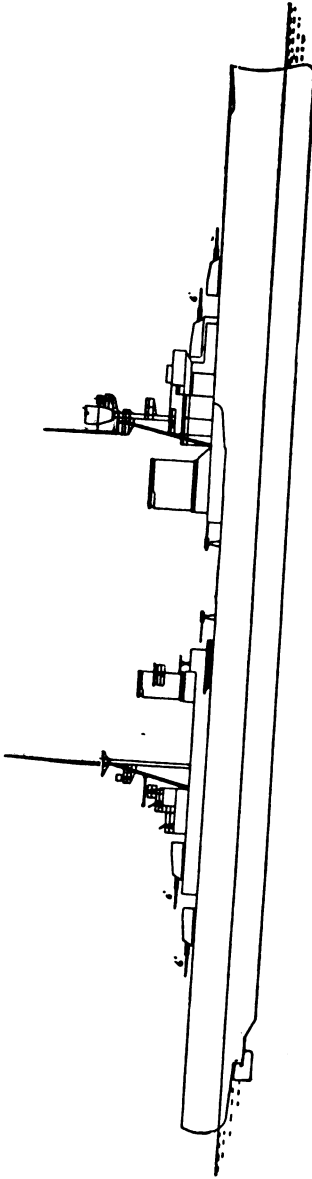
Length (extreme), 610 ft. 3 ins. ; 7,283 tons ; Speed, 36½ knots.
Armament, 8—6-in. ; 8—3.5-in. A.A. ; 8—1.8-in. A.A. ; 2 triple 21-in. torpedo tubes ; 1 catapult ; 3 aircraft.

ITALY.
CRUISER.
Montecuccoli.



Length (extreme), 597 ft. 9 ins.; 6,941 tons; Speed, 37 knots; Completed, 1935.
Armament, 8-6-in.; 6-8-9-in. A.A.; 8-1-5-in. A.A.; 8-5-in. A.A. M.G.; 2 twin 21-in. torpedo tubes; 1 catapult; 2 aircraft.
Correction to plan.—1 catapult fitted on M.L.

ITALY.
CRUISER.
Luigi Cadorna.



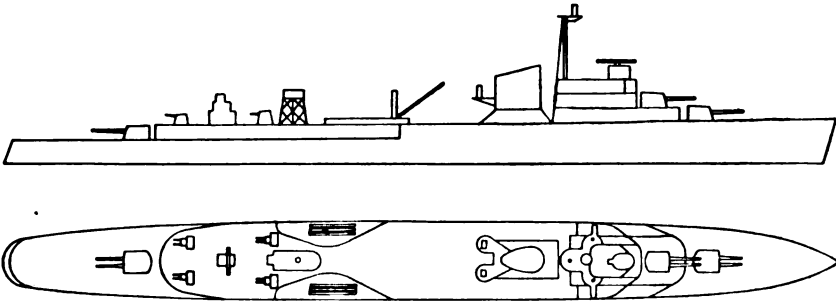
Length (extreme), 554 ft. 6 ins. 5,000 tons ; Speed, 27 knots ; Completed, 1903.
Armament, 8—6-in. ; 8—3-9-in. A.A. ; 8—1-1/2-in. A.A. ; 8—5 in. A.A. M. G. ; 4 torpedo tubes 21-in. ;
1 catapult and 2 seaplanes.

Corrections to plan : The bridge and foremast have been modified. The after twin 3-9-in. A.A. gun is at the superstructure level on a raised platform.
Derrick fitted on foremast, which has been moved forward of after funnel.
Torpedo tubes are abreast forward funnel.

NETHERLANDS.

LIGHT CRUISERS.

Tromp. Heemskerck.



Length, 433 ft. ; Displacement, 3,350 tons ; Completed 1938.

Armament, 6—5-9-in. ; many smaller in Tromp

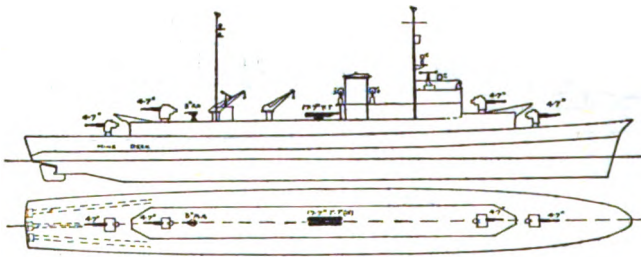
10—4-in., many smaller in Jacob van Heemskerck.

Heemskerck was completed in U.K., appearance is different.

NORWAY.

MINELAYER AND TRAINING SHIP.

Olav Trygvason.



Length, 319½ ft.; 1,747 tons; speed, 21½ knots; Completed, 1934.

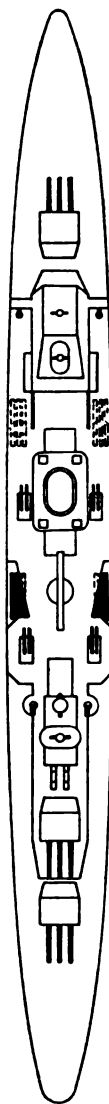
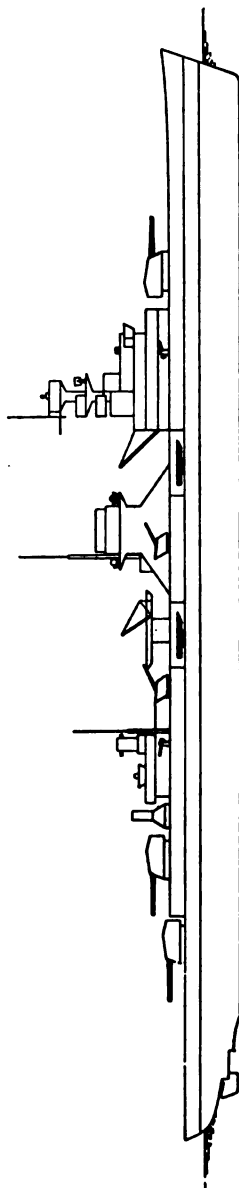
Armament, 4—4·7-in.; 1—3-in. A.A.; 2—17·7-in. torpedo tubes.
280 mines.

Correction to plan.—Both cranes are fitted abreast the mainmast.

SOVIET UNION.

CRUISER.

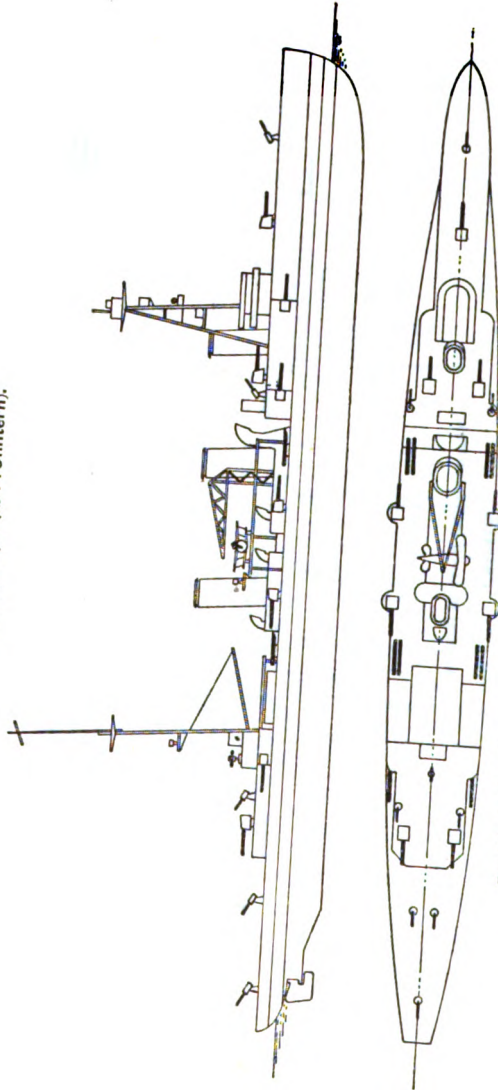
Admiral Makaroff (ex-Nurnberg).



Length, 557 ft. 9 in. ; Displacement, 6,000 tons ; completed 1935.
Armament, 9—5.9-in. ; 8—3.5-in., 8—1.5-in. ; 2 aircraft.

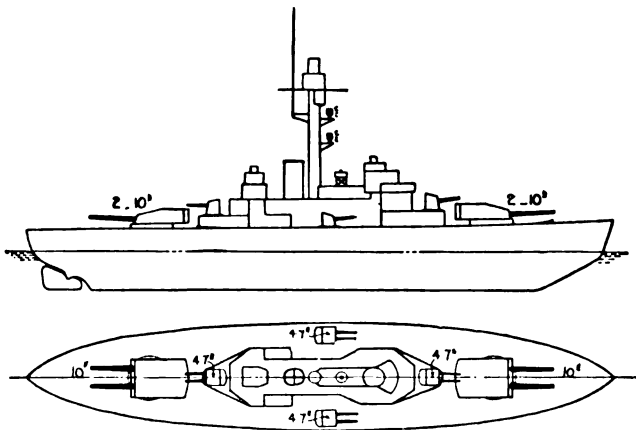
SOVIET UNION.
CRUISER.

Krasny Krym (*ex-Profintern*).



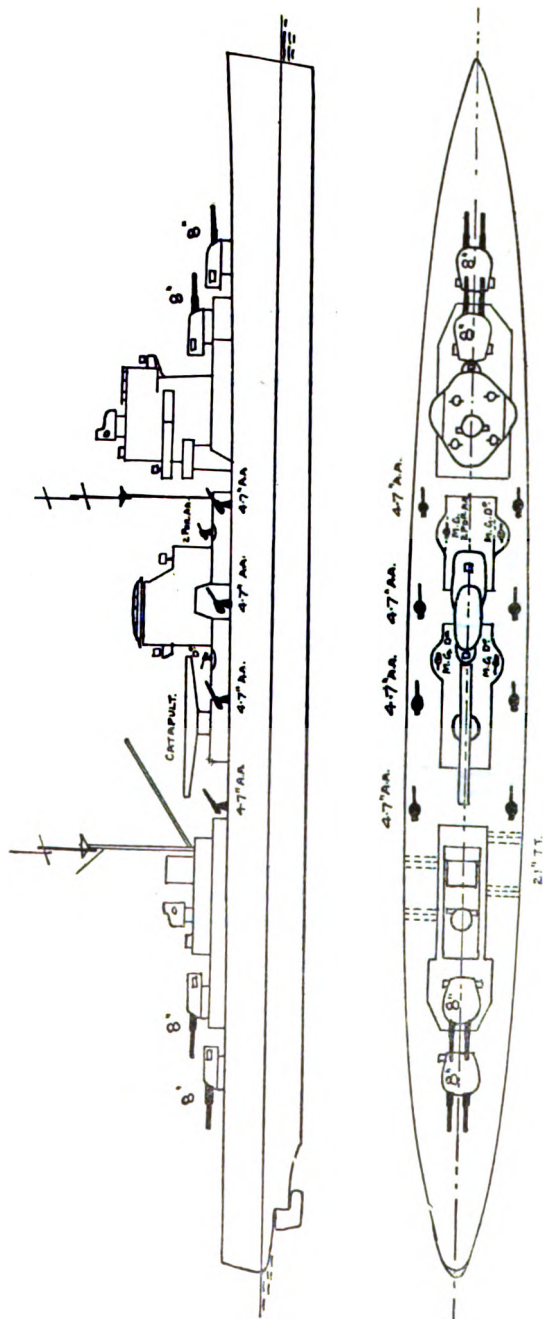
Length, 520 ft. ; Displacement, 7,200 tons ; Speed, 20½ knots ; Completed, 1925.
Armament, 15-5½-in. ; 4-4-in. ; 4-3-in. A.A. ; 4 M. ; 12-21-in. torpedo tubes ; 100 mines ; 2 seaplanes.

SOVIET UNION.
ARMoured GUNBOAT.
Väinämöinen.



Length, 300 ft. ; 3,900 tons ; Speed, 15 knots.
Armament, 4—10-in. ; 8—4'1-in. A.A. ; 4 m.
Completed, 1932—33.

SPAIN.
CRUISER.
Canarias.



Length (extreme), 636 ft. ; 10,000 tons ; 33 knots ; Completed, 1934.
Armament, 8—8-in. ; 8—4-7-in. A.A. ; 8—2-pr. A.A. ; 12—21-in. torpedo tubes ; 1 catapult ; 2 aircraft.
Masts removed.

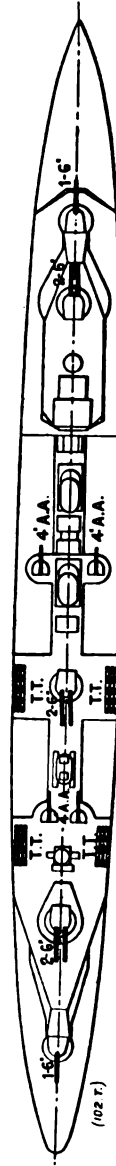
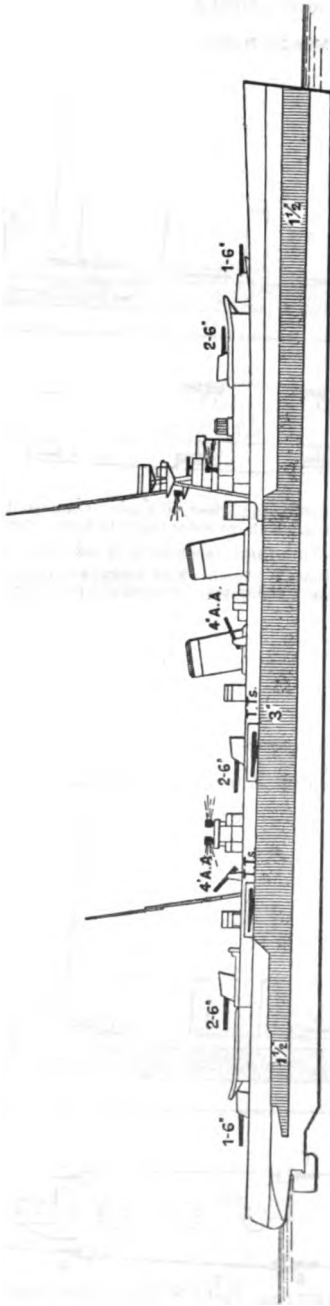
SPAIN.

CRUISERS.

Galicia (ex-Libertad, ex-Principe Alfonso).

Almirante Cervera.

Migue de Cervantes.



Length (extreme), 579 ft. 6 ins. ; 7,475 tons ; Speed, 33 knots. Completed 1927-1930.

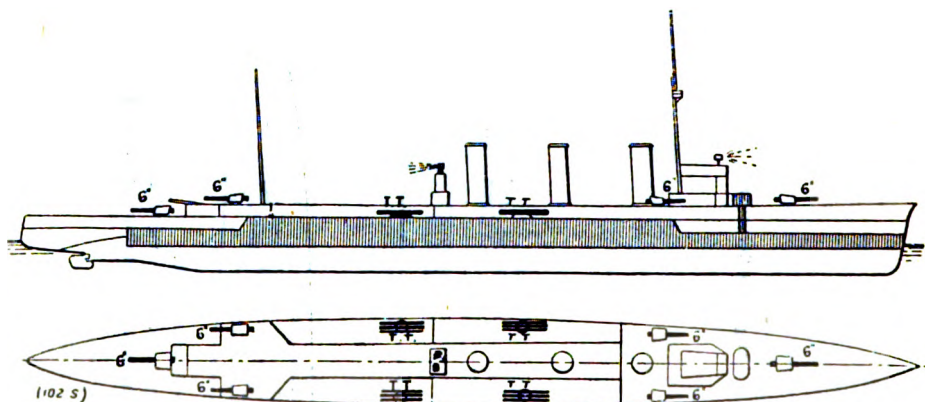
Armament, 8-6-in. ; 4-4-in. A.A. ; 2-3 pr. 1 M. ; 4 triple above-water torpedo tubes (21-in. torpedoes)

Corrections to plan.—The mainmast is tripod and has been moved forward. Fore topmast and topgallant mast removed.

SPAIN.

LIGHT CRUISER.

Mendez Nuñez.

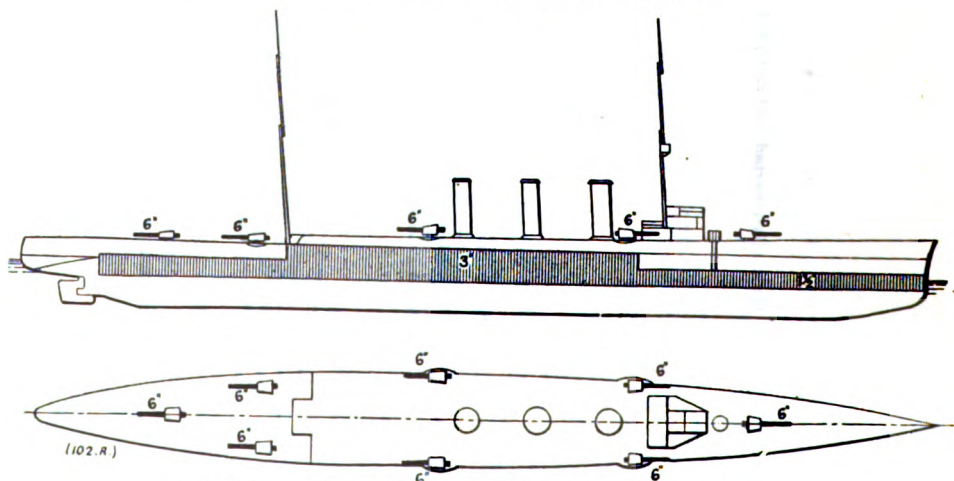


Length (extreme), 462 ft. ; 4,509 tons ; Speed, 29 knots. Completed, 1924.
 Armament, 6—6-in. ; 4—1·9-in. A.A. ; 4 M. ; 2 above-water triple torpedo tubes (21-in. torpedoes).

NOTE.—The armour belt is 3 ins. thick, tapering to 1½ ins. at the ends.

Corrections to plan.—The foremast is tripod. Fore topgallant mast is fitted.
 A.A. Armament is fitted between second funnel and mainmast. Searchlight platform added round after funnel.

LIGHT CRUISER.

Navarra (~~ex-Republica~~, ~~ex-Reina Victoria Eugenia~~).

Length (extreme), 462 ft. ; 4,857 tons ; Speed, 25½ knots ; Completed, 1923.

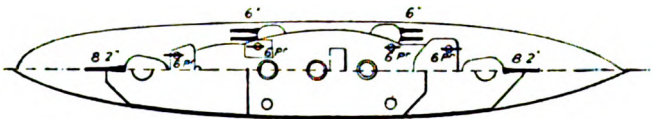
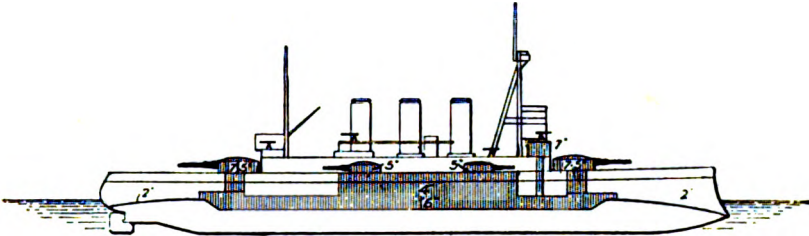
Armament, 8—6-in. ; 4—3·5-in. A.A. ; 4 M. ; 1 L.

Correction to plan.—Foremost funnel and masts removed. Tower built in place of foremast and superstructure built in place of mainmast and fitted with pole masts. A.A. Armament fitted in way of funnels. Upper deck extends further aft.

SWEDEN.

BATTLESHIP.

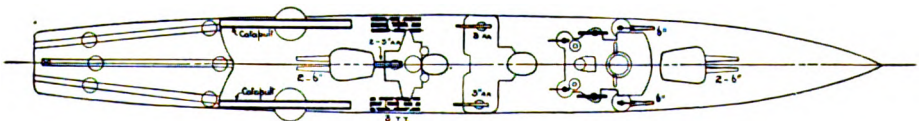
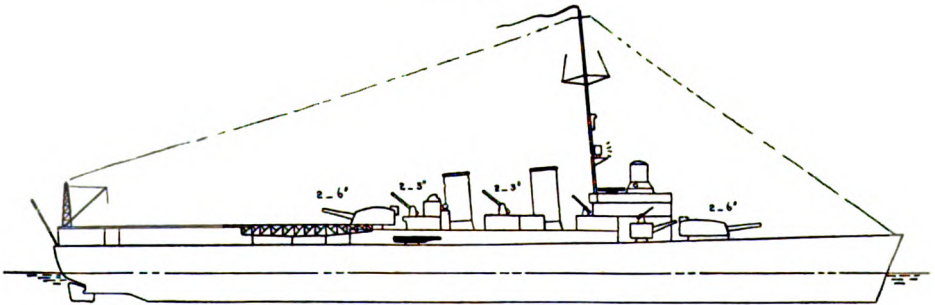
Oscar II.



Length, 313.6 ft. ; 4,250 tons ; Speed, 18 knots ; Completed, 1907.
Armament, 2—8.3-in. ; 8—5.9-in. ; 8—6-pr. ; 1—1-pr. ; 2 submerged 18-in. torpedo tubes.
Mainmast removed.

AIRCRAFT CRUISER.

Gotland.

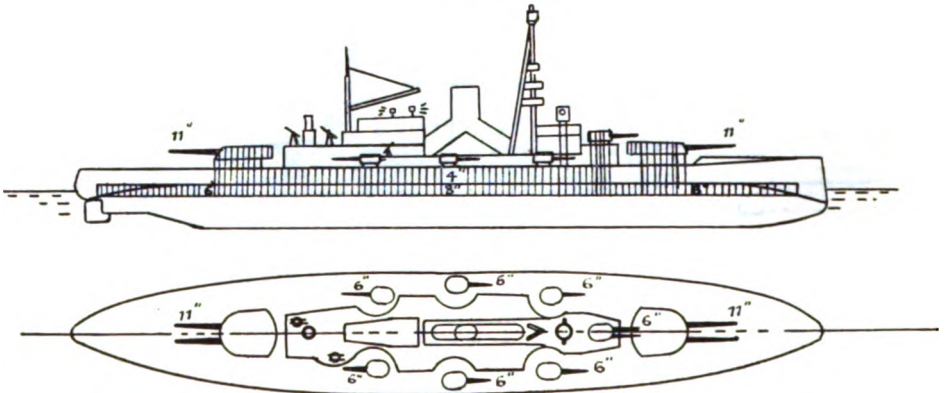


Length, 442 ft. ; 4,700 tons ; Speed, 27 knots ; Completed, 1934.
Armament, 6—6-in. ; 4—3-in. A.A. ; 4 M. ; 6—21-in. torpedo tubes ; 1 catapult ; 11 seaplanes ; 100 mines.
Correction to plan.—Has been reconstructed as an A.A. cruiser.

SWEDEN.

COAST DEFENCE SHIPS.

Gustav V. Sverige.
(As reconstructed 1924-29.)



Length, 396.7 ft.; Sverige, 6,899 tons; Gustav V, 7,100 tons; Speed, 23 knots; Completed 1917-21.

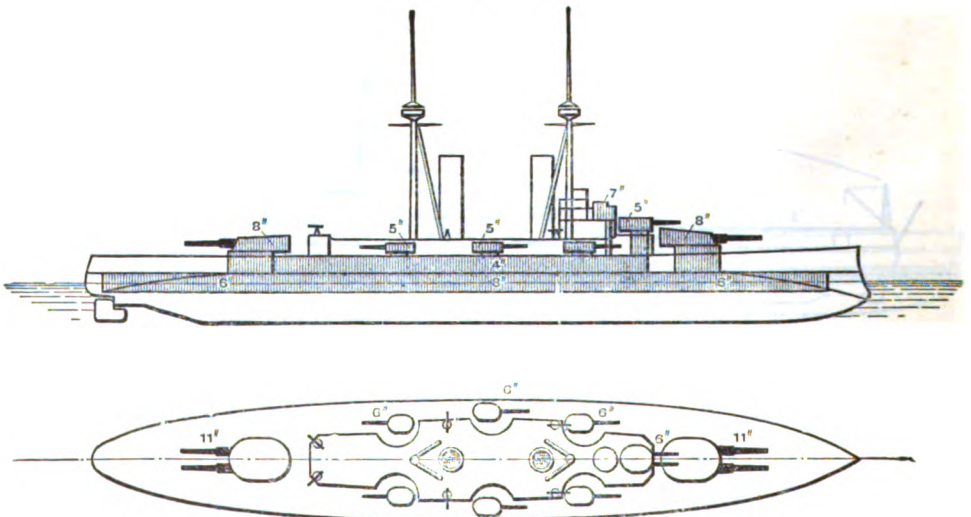
Armament, 4—11-in.; 6—5.9-in.; 4—3-in.; 2—6-pr.; 6 M.

Correction to plan.—Mainmast removed. In Sverige two funnels are fitted, the after one being vertical and the forward one bent.

SWEDEN.

COAST DEFENCE SHIP.

Drottning Victoria.



Length, 396.7 ft.; 7,100 tons; Speed, 23 knots; Completed, 1921.

Armament, 4—11-in.; 8—5.9-in.; 4—3-in.; 2—6-pr.; 9 M.

Mainmast removed. Searchlight platform and A.A. guns fitted abaft after funnel.

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a.a.cr. anti-aircraft cruiser; *a.cr.* armoured cruiser; *a.g.* armoured gunboat; *air.c.* aircraft carrier; *air.cr.* aircraft cruiser; *air.t.* aircraft tender; *air.tr.* aircraft transport; *a.s.* armoured ship; *a.t.* aviation transport; *b.* battleship; *b.cr.* battle cruiser; *c.d.* coast defence ship; *cr.* cruiser; *cr.m.l.* cruiser minelayer; *d.* destroyer; *e.c.* escort carrier; *f.c.d.* first-class destroyer; *f.c.l.t.b.* first-class torpedo-boat; *f.l.* flotilla leader; *l.air.c.* light aircraft carrier; *l.cr.* light cruiser; *l.f.c.* light fleet carrier; *m.l. & t.s.* minelaying and training ship; *s.c.d.* second-class destroyer; *s.cr.* scout cruiser; *sea-p.c.* seaplane carrier; *tr.cr.* training cruiser.

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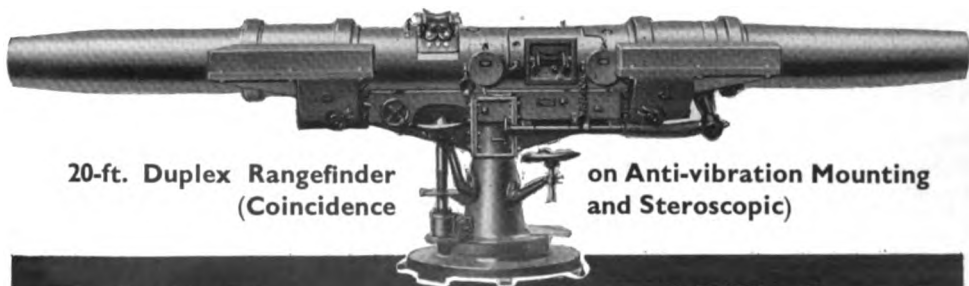
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